the OIL AND GAS JOURNAL

MARCH 5, 1956

With Ike's "Yes"—What Now? p. 58

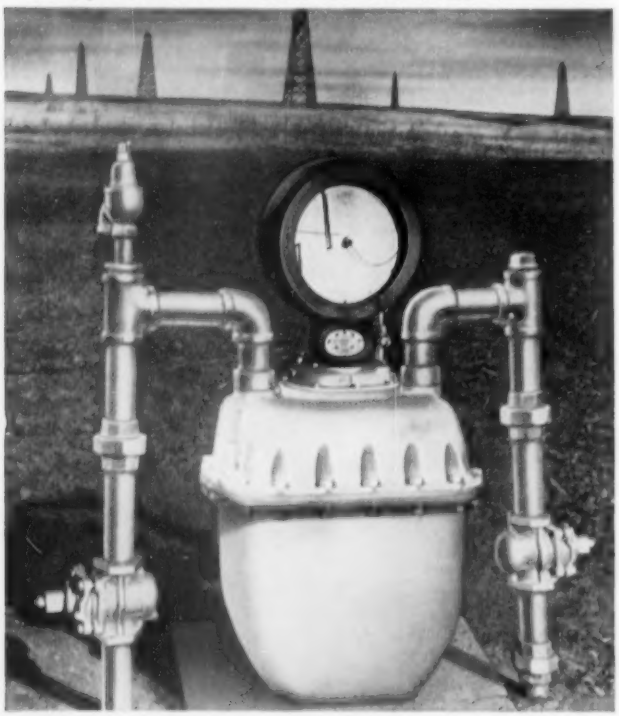
Powerforming—New Octane Booster p. 62

How Gas Pipeliners See Future p. 70

Fluid Motors for Auxiliaries Speed Drilling. p. 90

(ABOVE) Installation of two Rockwell "800" meters in West Texas field with manifold controlled by Rockwell-Nordstrom valves.

(BELOW) Rockwell "800" meter with Combined Record Gauge measuring 75 lb gas in Kansas field. The valves are Rockwell-Nordstrom.



Recommended installation is off the ground and away from alkaline soil.

Portable, Corrosion Resistant Rockwell Aluminum Meters

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at up to 100 lb. working pressure

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ROCKWELL "800" Aluminum GAS METER

A glance ahead . . . at press time

These trends will make TOMORROW'S NEWS

Look for more low-pressure polyethylene plants to be built in the Southwest.

Following Grace Chemical's announcement of a plant for Baton Rouge (February 27, page 83) Celanese Corp. and M. W. Kellogg Co. are expected to announce similar plans, probably for the Houston area. All three will use the new Phillips process.

Kellogg is expected to get into the propylene polymer field, pointing to a new trend which will make refiners more conscious of C_3 olefins.

Offshore drillers soon may be working in water more than 150 ft. deep off Louisiana. Gulf Refining Co. has filed with the Corps of Engineers for a routine permit to operate in a block covering more than 44,000 acres in the South Timbalier area about 90 miles southeast of Morgan City, La. Depth of water ranges from about 90 to 170 ft.

Liquidation of Houston Oil Co. of Texas probably will be delayed until next summer because of the great amount of paper work involved. Stockholders are to meet April 24 to act on proposed sale of the company. Proposal calls for sale of oil and gas properties to Atlantic Refining Co.

Sale of its Cuban properties is being considered by Kerr-McGee Oil Industries. Kermac is talking to Siboney Development & Exploration, Tulsa, which is drilling its first wildcat on a 5,000,000-acre concession in Cuba.

Kermac has a 25 per cent interest in 15,000 acres in the Jatibonico field area. Thirteen wells drilled by the company averaged 40 to 50 bbl. a day each.

Small refiners may get a larger share of contracts for military oil supply. The Armed Services Petroleum Purchasing Agency is making a survey of plants with fewer than 500 workers—the Defense Department's dividing line between big and little business—with a view to setting aside more contracts for them.

Divorcement of marketing from other operations in the oil industry may be pressed as the "cure" for gasoline price wars.

Sen. Hubert Humphrey of Minnesota has suggested that the Federal Trade Commission make a full study of marketing and the "feasibility" of divorcement. The FTC tried to get funds for such a study several years ago but was turned down by Congress.

Waste steam will be put to work soon by United Gas Pipe Line in another "save the squeal" move. United will take steam from the vapor-phase cooling system of a compressor engine, use it to drive a turbine driving a cooling-tower fan. The turbine will use 15-psi. steam, provide about 10 hp. to fan.

the OIL AND GAS JOURNAL

MARCH 5, 1956 • VOLUME 54 • NUMBER 44

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OIL AND GAS PIPELINES • REFINING • PETROCHEMICALS
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TECHNOLOGY—OPERATION

Drilling—Production

Fluid Motors for Driving Rig Auxiliaries **90**
By J. O. Scott
This equipment is filling the need for rugged, compact power packages. Units are interchangeable, small, flexible, spark-proof, and have high torque characteristics.

Electric Logging—4: Resistivity Curves **93**
By Robert V. West., Jr.
Here are details on the use of the MicroLog and the Microlaterolog.

Knitted-Wire Mist Extractors and How They Work **115**
By Dr. Jean M. Campbell
Increased use is being made of knitted-wire mesh mist extractors in field processing operations. These units are very effective in removing entrained liquids and solids from gases.

Field Processing **125**

Refining—Processing

Here's How Gulf Coast Refiners Conduct Training Programs **86**
By Larry Resen
Answers to these questions: Do Gulf Coast refiners emphasize training programs in their operations? If so, how are they carried out. How important are they thought to be?

Three Ways to Fight H_2S Corrosion **104**
By E. B. Backensto, C. D. Drew, and C. C. Stapleford
Results from laboratory, pilot plant, and commercial units show that H_2S corrosion can be reduced by: (1) reduction of H_2S in process streams, (2) use of chrome-nickel alloys, and (3) aluminum coating.

El Paso Moves 324,000-Lb. Deethanizer **109**
By Frank J. Mangum
El Paso Natural has designed and constructed a crawler trailer for handling loads up to 600,000 lb. A 77-ft., 324,000-lb. vessel was moved 30 miles from railroad to plant by means of this trailer.

On-The-Job . . . In the Plants **112**
LaGloria improves remote radio setup . . . How to use gas to move alkylation acid . . . Centrifugal separator removes sand from makeup water . . . How to simplify removal of babbitt linings . . . Reflectors simplify tank-level gaging—New bar helps threaded-flange makeup.

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Exploration

Hugoton Embayment Commands Fresh Look **82**
By Daniel P. Merriam
The Hugoton embayment in Kansas is being given a new look as the result of oil discovery in the Arbuckle rocks in this region.

Pipelining

New Machine Cuts Cost of Padding Pipeline Trenches **88**
By Paul Reed
A new machine for use during pipeline construction in rocky country moves dirt for padding from the backfill of the spoil bank to the ditch.

Stripper Plant Boosts Pipeline Efficiency **97**
By A. W. Rifenburg
By installing a liquid-removal plant, Mississippi River Fuel Corp. upped pipeline efficiency from 76 to 92 per cent and kept it there. As a bonus, the stripper plant paid for itself in 3½ years from sale of removed liquids.

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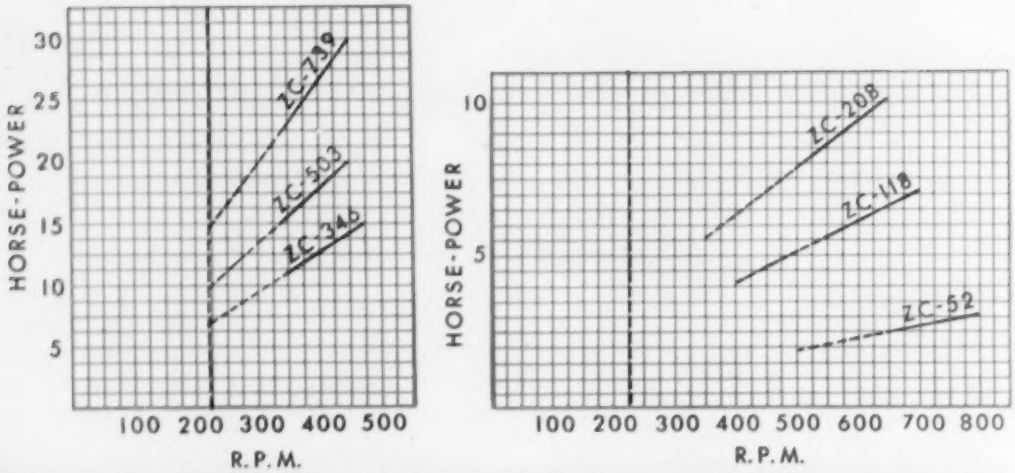

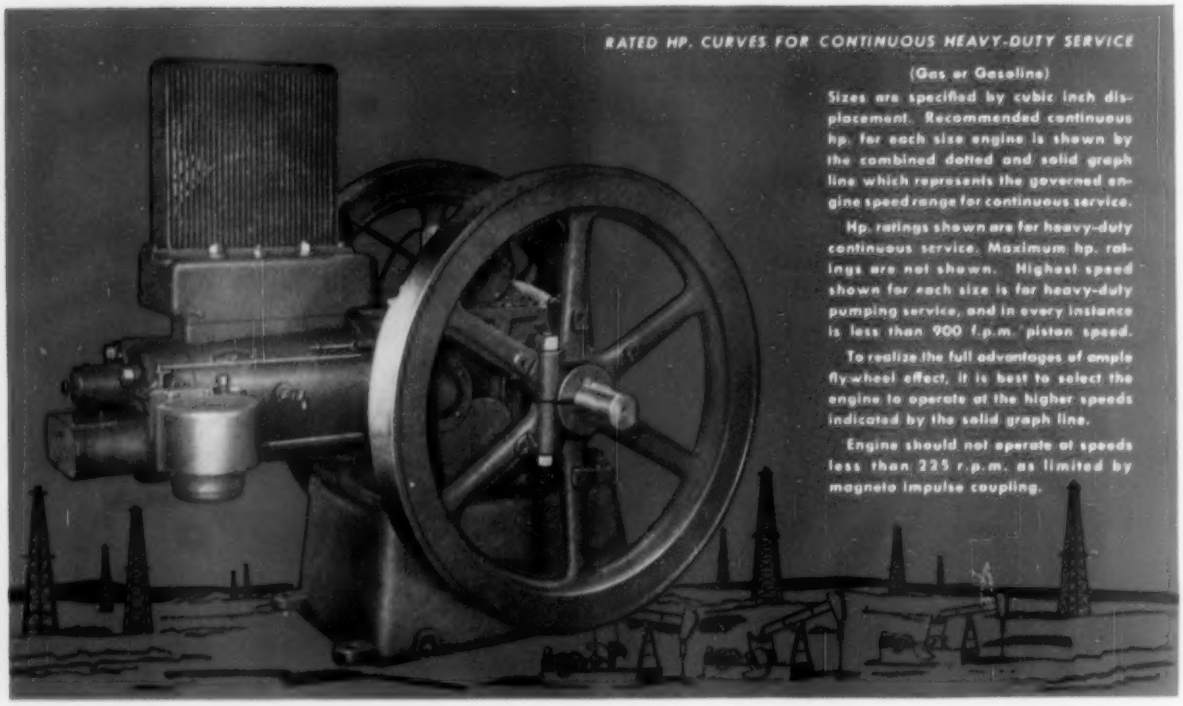
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B.F.Goodrich

2½ years, 200,000 feet with one set of B. F. Goodrich V belts

A typical example of B. F. Goodrich improvement in rubber

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Grommets are two extra strong cord loops inside the belts, like twisted cables except that they're endless. Since there are no center cords, the Grommet belt is more flexible, and so can "give" temporarily and absorb shock loss. And there's no overlapping cord *section* as in all ordinary belts—no weak spots to cause premature belt failure.

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Grommet—T. M. The B. F. Goodrich Co.

B.F.Goodrich

INDUSTRIAL PRODUCTS DIVISION

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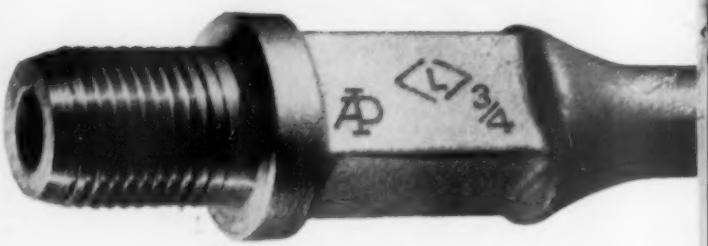

METALLURGISTS and oilfield operators know by their records that "Oilwell's" Grade "L" Sucker Rods far outlast other rods in carbon dioxide areas.

When these rods, which are high in nickel and chromium and are fully normalized and tempered, are subjected to carbon dioxide (sweet type) corrosion, a thin deposit of calcareous substances quickly forms on the rod's surface. The rod's unique grain structure promotes the retention of this deposit as a thin surface coating which insulates the metal rod from further contact with corrosive elements; thus inhibiting further attacks on the metal and extending—sometimes indefinitely—its useful service life. The assistance of a chemical inhibitor is warranted, however, in severe corrosive conditions.

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As a matter of fact, service life 2 to 3 times longer is common when "Oilwell" Grade "L" Sucker Rods are used to resist CO_2 corrosive conditions.

SEND for a free copy of our Sucker Rod Comparison Chart . . . and let an "Oilwell" Production Specialist show you why Grade "L" Sucker Rods are superior to other rods in combatting "ringworm" corrosion. Then try alternating Grade "L" with the rods you previously favored . . . in your own well.

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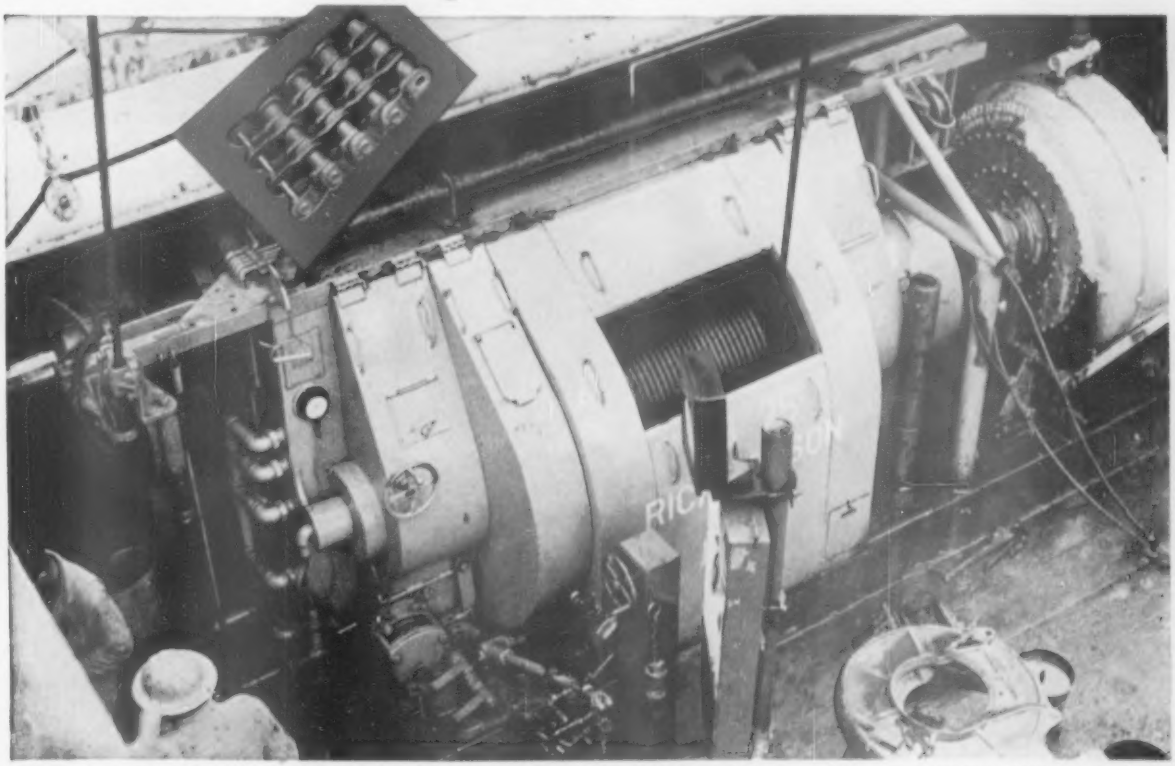

National Supply Co. drawworks on Richardson and Bass Rig 25, holder of new world's record for deep drilling, uses Link-Belt API (SS type) chain.

LINK-BELT SS-3125 type Double and Triple drive drawworks and engine

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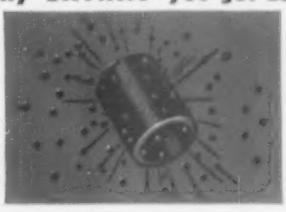

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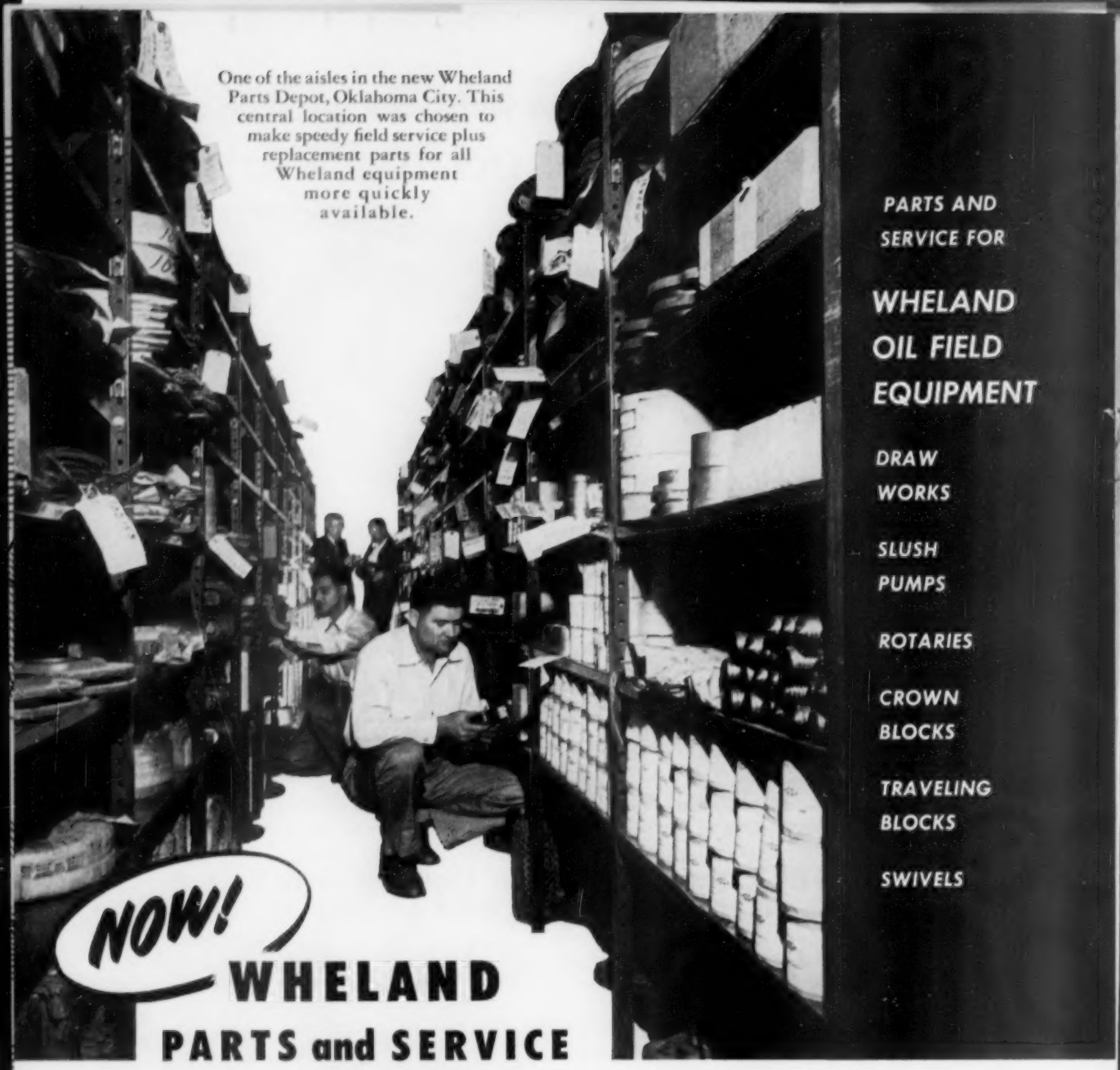
CADMIUM PLATING OF PINS prevents rust, avoids corrosion fatigue in these flexing members.



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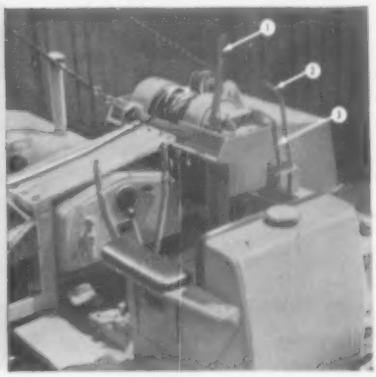

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drying wells treated in a few hours by

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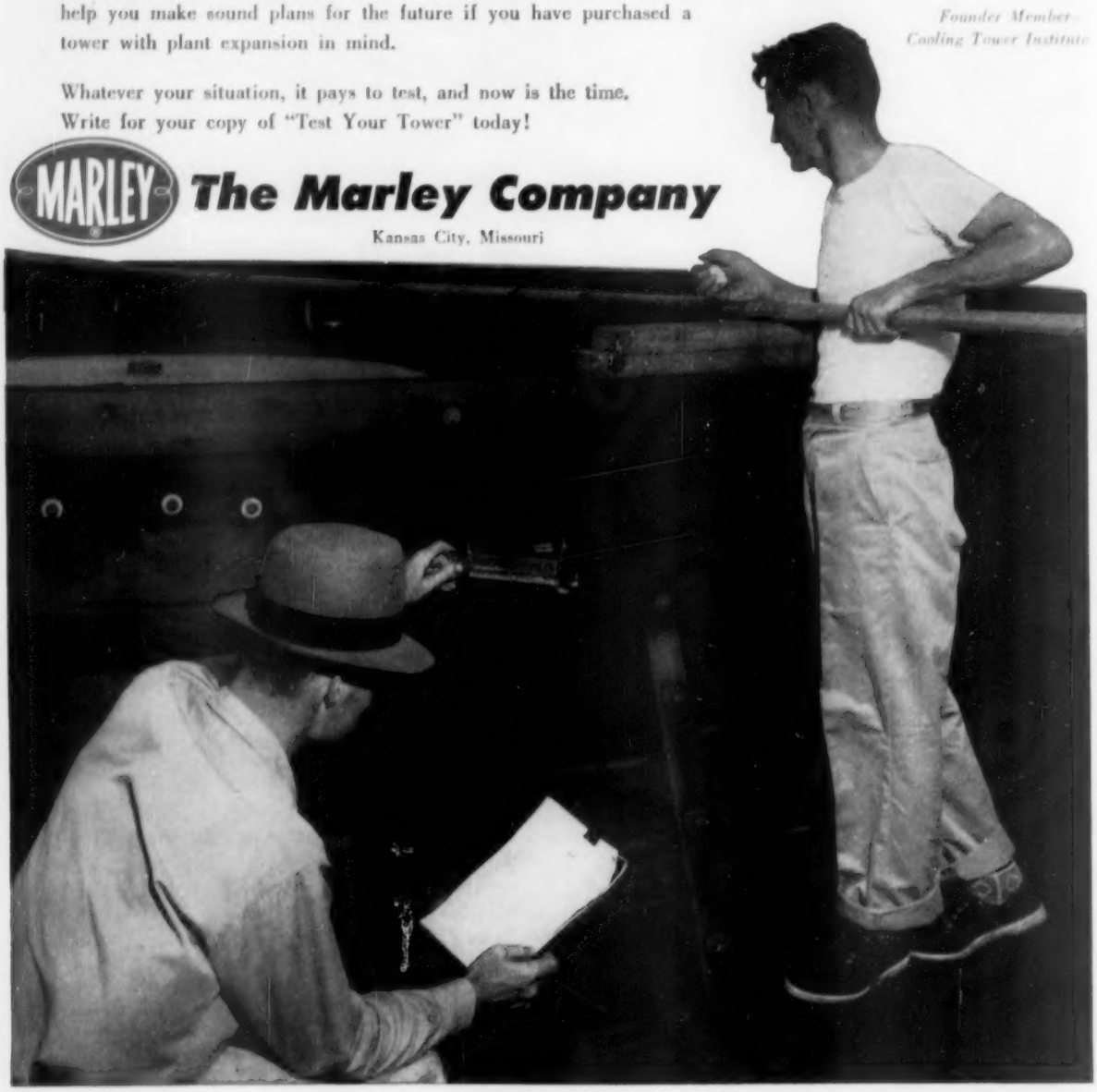
Founder Member—Cooling Tower Institute

Whatever your situation, it pays to test, and now is the time. Write for your copy of "Test Your Tower" today!

MARLEY **The Marley Company**

Kansas City, Missouri



Amazing new electronic "inspector" detects slightest imperfections in wire rope

This new inspection machine literally "sees through" wire rope and detects any imperfections that may occur in the manufacturing process. It inspects every inch of rope, 360° around, and *all the way through!* If an imperfection occurs, the machine instantly records it on a chart, squirts paint on the rope, lights a light and alerts the operator to correct the flaw.

In the preliminary tests using wire rope containing specimen broken wires, the electronic "inspector" proved 100% effective. It didn't miss one. These tests prove to us that this device will give the regular inspector a superior tool which will work continuously and will "see" all.

To our knowledge, American Steel and Wire Division is the first wire rope manufacturer to recognize the possibilities of this electronic inspection device as an *extra* step in quality control that will assure better, more uniform wire rope.

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Excellay Preformed

USS TRADE MARK

UNITED STATES STEEL

Mobility In Big Capacity Spudders *Pays Off With Faster Well Completions*

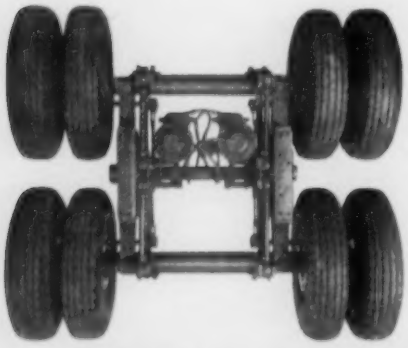
Compactly Built Tandem Axle Mounting Speeds Between-Job Moves

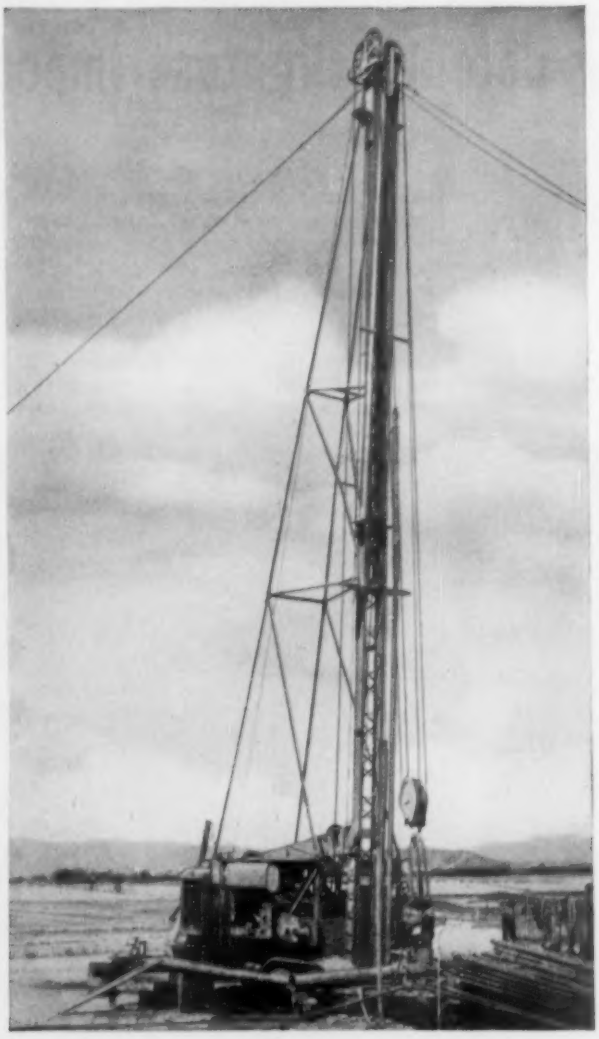
Despite their size, Bucyrus- Erie 36-L and 48-L spudders can be moved readily. Mounted as a semi-trailer with tandem rear axle, they can be transported as a single compact unit — at normal highway speeds. This means more time spent on productive drilling, greater profits for you.

Eight large wheels, equipped with fast-acting air brakes, evenly distribute the rig's weight. Heavy-duty tires cushion the machine on the highway and off. Since the axles are free to oscillate independently of the frame, the wheels can follow uneven ground without putting undue stress on the frame.

Upon reaching the drilling location, a Bucyrus-Erie spudder is "making hole" in short order. The telescoped derrick is power raised and extended — braces fall right into place. Even the big 48-L can be rigged up and readied for work in a matter of hours instead of days.

Mobility is just one of many reasons why these machines give you faster well completions. Get full details from your Bucyrus-Erie spudder distributor — the 36-L for drilling to 3,500 feet, servicing to 4,000 feet; the 48-L for drilling to 6,000 feet, servicing to 7,000 feet. 12555



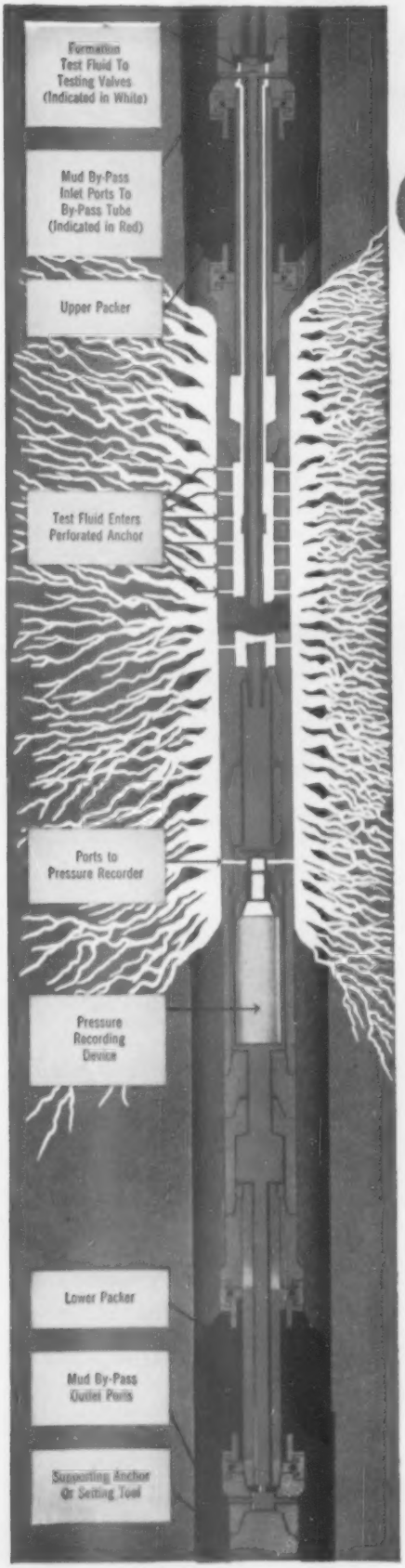


BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

This 36-L spudder, equipped with tandem axle mounting, was drilling-in a well in Oklahoma. Estimated depth was 1,600 feet.

BUCYRUS ERIE


Formation Test Fluid To Testing Valves (Indicated in White)
Mud By-Pass Inlet Ports To By-Pass Tube (Indicated in Red)
Upper Packer
Test Fluid Enters Perforated Anchor
Ports to Pressure Recorder
Pressure Recording Device
Lower Packer
Mud By-Pass Outlet Ports
Supporting Anchor Or Setting Tool

Straddle Testing

in open hole
another Johnston first*

Now, with complete confidence, you can...

- EVALUATE UP-THE-HOLE ZONES
- LOCATE GAS, OIL, AND WATER CONTACT
- HELP PROTECT HOLE AND SUPPORTING ANCHOR

See how Johnston Straddle Testing with STRADDLE MUD BY-PASS maintains full hydrostatic mud pressure on upper and lower packers—and on all formations below lower packer. Lessens the load on supporting anchor and prevents production from any lower zone in the event of lower packer failure. Should either packer fail, you get an immediate surface indication. Get all these advantages plus ease of running tool into and out of the hole.

*Johnston Straddle Testing with Straddle Mud By-Pass is covered by patent and patents pending. Another Johnston first!

for descriptive folder write to:

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first in drill stem testing

P. O. Box 98,
HOUSTON, TEXAS

LOS ANGELES, CALIF. • CALGARY, CAN.

FORMATION AND CASING TESTING — JOHNSTON

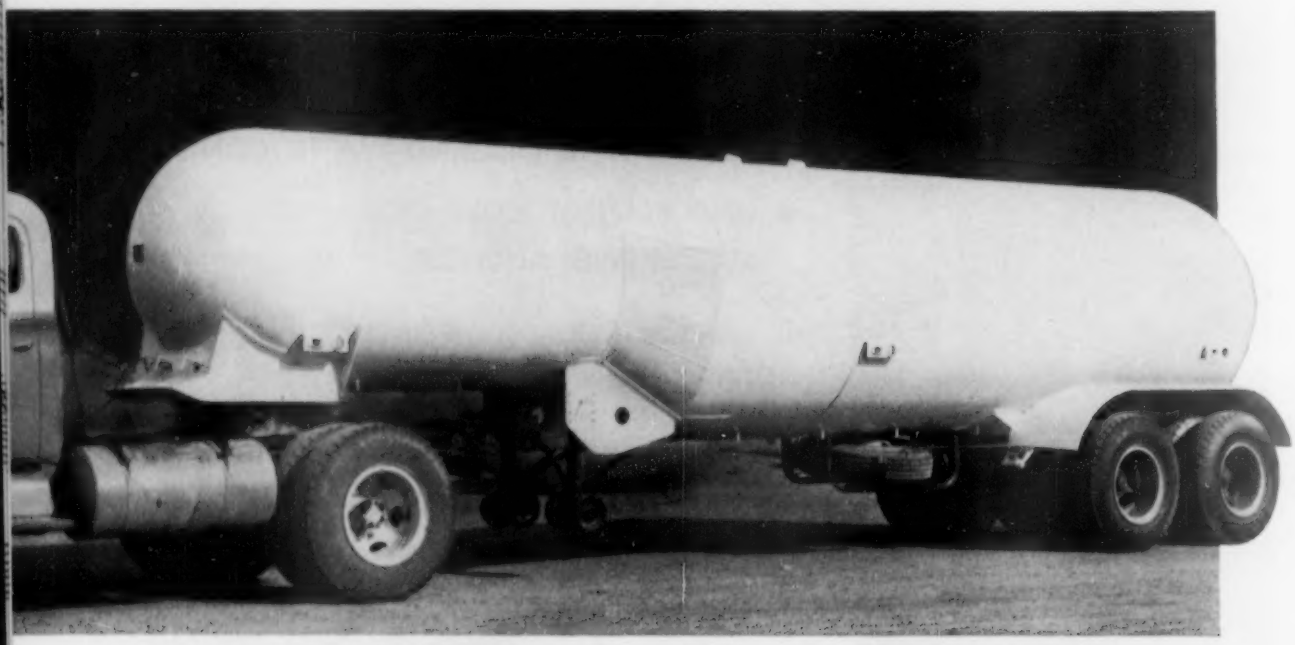
ST-551

USS "T-1" STEEL BOOSTS PAYLOAD

In mobile tank trucks like this one, new USS "T-1" Steel is expected to reduce deadweight by more than a ton. That means an *extra ton of LP gas* can be carried on each trip. It means faster delivery, lower transporting cost, greater profit.

It was for jobs like this that United States Steel developed USS "T-1" Steel. Jobs that need tremendous strength to withstand high tensile stresses . . . tremendous toughness to withstand jars and jolts, and to perform in any weather with no chance of brittle failure. Jobs that demand good weldability to cut the cost and difficulty of fabrication.

USS "T-1" Steel gives you a yield strength of 90,000 psi minimum, and a tensile strength of 105,000 psi minimum. It is so tough that it will successfully withstand severe impact at sub-zero temperatures, and with the proper electrodes, "T-1" is as easy to weld as carbon steel.



FREE LITERATURE Case 1204, a special ruling of the ASME Boiler and Pressure Vessel Committee, gives full particulars about the use of "T-1" in vessels, which can be applied to mobile tank units. Write for your free copy. We'll also send you full technical information on the use of "T-1" in other applications where it enables you to reduce weight or cost, or to increase strength or durability in rugged service. Write or wire, United States Steel, Room 5224, Pittsburgh 30, Pa.

UNITED STATES STEEL CORPORATION, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS "T-1" CONSTRUCTIONAL ALLOY STEEL

USS

UNITED STATES STEEL

for better economical casing perforating . . . Twin Jets fill the bill.
for better squeeze cementing . . . Four shots in a plane from 4-Way Jets.
Welex Perforating SPECIALISTS . . .
for every completion need
A jet perforator for every job . . . and every one developed by Welex to meet a specific need. All jets have been thoroughly tested and proved. When you call on Welex . . . you will get exactly the right type and size of jet that will give you maximum performance and better completions.
ORIGINATORS OF Welex JET PERFORATING
CALL WELEX AND BE SURE!!
for better open hole shooting . . . Maximum power Torpedo Jets.
for better permanent-type completions . . . Swing Jets for full power thru tubing.
for better jet casing perforating . . . A Perfo-Jet gun for every size of casing.

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WELEX JET SERVICES, INC.

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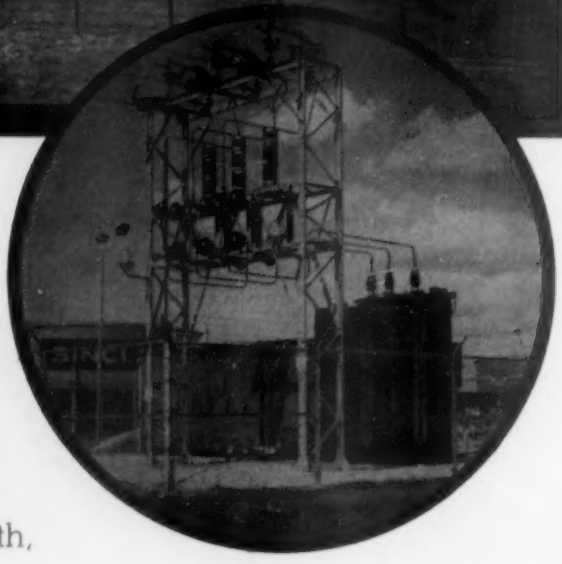


From Key Station on down the line- Powered with Utility Electric Power! The biggest assets of Electric Power are dependability, efficiency and lower operating costs, utilizing remote automatic controls. Utility Electric Power also gives you smooth, uninterrupted performance — that's tailored for the individual job. It's also flexible enough to meet unforeseen requirements. Big or small — Utility Electric Power — fits them all!

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR POWER FACTS

Petroleum Electric Power Association

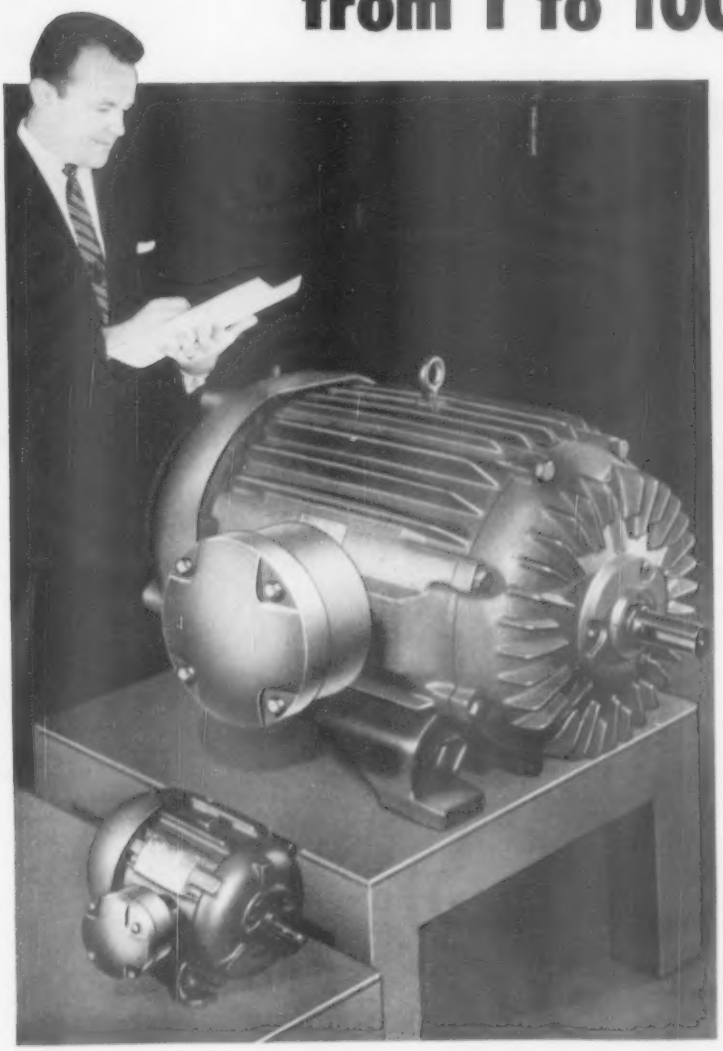
P. O. BOX 2771, DALLAS, TEXAS

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

There's MORE rating selection available in Allis-Chalmers MOTORS

To meet refinery needs...

Allis-Chalmers Offers Complete Line of Rib-Type MOTORS from 1 to 100 Hp



Allis-Chalmers, a pioneer in rib-type TEFC motor design, is the only leading manufacturer offering a complete line of these motors from 1 to 100 hp. The many cost-saving features of deep-rib construction can be applied in a variety of uses . . . both indoors and out.

Here's why these motors can cut refinery costs:

MORE cooling surface — Rib-type design provides reserve cooling capacity in dirty locations.

MORE iron—Cast-iron frame and external parts assure rigidity and resistance to corrosion.

MORE copper — Allis-Chalmers greater use of copper increases electrical life.

MORE lubrication provisions — Large grease reservoirs surround bearings. Provision made for in-service relubrication — important where moisture or corrosive vapors contaminate grease.

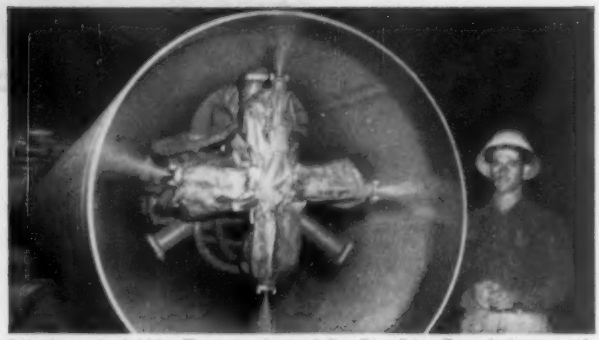
As a new machinery component or as replacement, specify Allis-Chalmers. To find out more, contact your nearby Allis-Chalmers distributor, district office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

A-4963

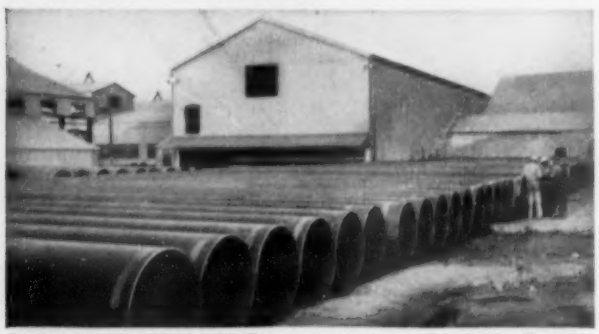
ALLIS-CHALMERS

EPON® RESIN does it!

New Internal Coating *protects pipelines against corrosion by crude oil, salt water, gas*



36" pipe to be laid by Transcontinental Gas Pipe Line Corp. being coated with *Copon*, containing Epon resin. *Copon* is manufactured by Coast Paint and Lacquer Co., Houston.



Stock of 36" pipe, lined with Epon resin coating, to be used by Transco.

HERE'S HOW...

INTERNAL CORROSION of gas pipe lines has long been a costly maintenance problem. The solution is an Epon resin coating that stands up to corrosives, that does not flake or peel off, that can be readily applied.

Such an Epon resin-based enamel is now going to work in nearly 300 miles of line for Transcontinental Gas Pipe Line Corp.

It's a *one-coat*, amine-catalyzed system which, cured at atmospheric temperatures, gives the performance of many baked finishes never before obtained with any other cold-cure coating. The Epon resin liner has complete adhesion to metals and extreme resistance to corrosion that keeps gas free of rust and pipe scale.

If you need a paint that lasts longer, that has excellent adhesion, resistance to abrasion and impact, ability to withstand a wide range of temperatures, humidity and corrosive atmospheres . . . ask for *Epon resin coatings*. Call on our sales offices for names of suppliers. Write for the full Epon coatings story in the brochure, "Planning to Paint a Pyramid?"

Epon resins are the epoxy polymers made exclusively by Shell Chemical Corporation.

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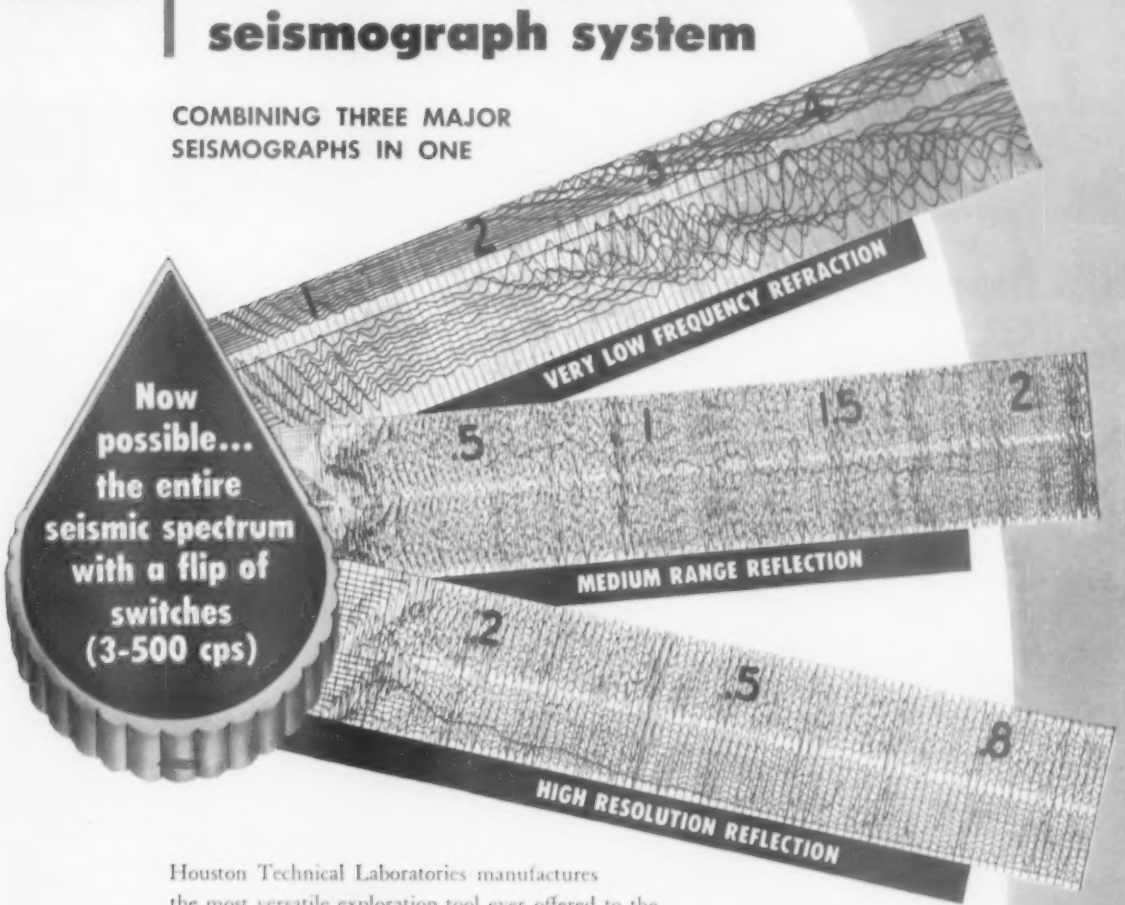
HTL | 7000 B "all purpose" seismograph system

COMBINING THREE MAJOR SEISMOGRAPHS IN ONE


Now possible... the entire seismic spectrum with a flip of switches (3-500 cps)
VERY LOW FREQUENCY REFRACTION
MEDIUM RANGE REFLECTION
HIGH RESOLUTION REFLECTION

Houston Technical Laboratories manufactures the most versatile exploration tool ever offered to the industry . . . the 7000 B "all purpose" seismograph system.

In the "all purpose" seismograph, the entire seismic spectrum (3-500 cps) is at your fingertips . . . High Resolution Reflection Recording, Conventional Reflection Recording, and Very Low Frequency Refraction Recording. The camera used in the 7000 B system, the RS-8U Recording Oscillograph, permits instantaneous change of paper speeds for the three seismic methods. Further, the 7000 B is the ultimate in seismographs to meet the exacting requirements for magnetic operation, performing equally well in the field recorder and playback system, or in an office analysis system.

Versatile 7000 B seismographs have proved their worth in widely varying world operations. Whatever your exploration program, rapid reconnaissance or close detail work, the 7000 B enables you to exploit every seismic method to the fullest extent.

A Seismation* SYSTEM

*Trademark registration applied for.

Write for complete information on the 7000 B Seismograph. Specify Bulletin No. S-309.

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A SUBSIDIARY OF TEXAS INSTRUMENTS INCORPORATED

2424 BRANARD • HOUSTON 6, TEXAS, U.S.A. • CABLE: HOULAB

NOW *bid beating... dirt heaping...* 1956

10% bigger payloads!

Model "75" . . . boosted to 20 yds heaped (without sideboards) . . . 262 hp.

Model "55" . . . boosted to 14 yds heaped (without sideboards) . . . 172 hp.

Wide-base tubeless tires and windshield, shown, available as optional equipment.

1 **Wider "Target" Push-Block** makes it easier to make and maintain contact. Helps to cut loading and cycle time.

2 **Straight-Line Ejector Reeving** requires minimum power; leaves more power on Payscraper wheels for faster dumping and spreading. Also speeds re-threading time.

3 **Sturdy Cover Plates** protect new, stronger cylindrical ram and air tanks.

4 **New, Straight-Back Bowl** lets you heap and haul more dirt every trip. Struck capacity, *with sideboards*. 18 cubic yds on "75"—12 cubic yds on "55".

5 **Higher Apron Lift,** bigger apron opening, provides cleaner, more rapid dumping, especially of "sticky" materials.

6 **Fast-Acting Apron,** arms mounted outside bowl, assure quick, positive closing of apron. Payscraper holds the load from cut to fill.

7 **Lowered Draft Frame** provides operator with "control tower" visibility of bowl and push-tractor . . . also helps direct push and pull power more efficiently to cutting edge for faster loading.

8 **Larger, Wider Fenders** give greater safety for operator, greater protection for machine.

International Payscrapers®

Put the 1956 International Payscraper to work on your job, and watch dirt boil up into its new, straight-back bowl. You've never seen any big scraper load as easily or as fast. In seconds, you've packed in up to 23 heaped yards. Its offset 3-section blade breaks the ground like a sharp-pointed spade. Dirt boils from the smooth-slicing cutting edge and fills the corners to build a full heaped load. Close the apron instantly, positively, on this huge, well-compacted load and you carry all the dirt you've heaped in.

Now, drive easily, effortlessly with safe hydraulic power steering at a fast clip to the fill. Note how the 1956 Payscraper's extremely high ratio of horsepower to capacity and its rapid acceleration to 24 mph top speed add up to more trips per hour than any other self-powered scraper you've ever used. Yes sir, it's a real profitable dirtmover, this 1956 Payscraper! Try one yourself on your job! See your International Industrial Power Distributor for a demonstration.

Maximum 52° Oscillation
from right to left takes the stress and strain out of hauls over furrows, rough ground.

Adjustable 3-Piece Cutting Edge
for clean, fast cutting and loading under all soil conditions.

New, Long-Lasting Clutch
of ceramic material and powdered metals, successfully resists heat and wear over longer periods. Available on Model 75 only.

INTERNATIONAL HARVESTER

International Industrial Power

INTERNATIONAL HARVESTER COMPANY, 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Tractor and Rubber-Tired Loaders . . . Diesel and Carbureted Engines . . . Farm Machinery . . . Motor Trucks.

CREATIVE BANKING

and the stopped pumps

Creative banking represents more than an interest in your problem. It begins with a detailed knowledge of current conditions, such as lower allowables, stopped pumps. And from this knowledge of the oilman's problems, the ground work to help is laid.

Creative banking works for you. Creative banking means financing flexible enough to help you when help is needed; flexible enough to meet changing conditions as they arise. It means no hard and fast rules to hamper sound financial planning and assistance. Creative banking at The National Bank of Commerce gives you the financial help you need rather than imposing a financial burden.

The experience and resources of The National Bank of Commerce of Houston are now being used in Wyoming, Colorado, New Mexico, Texas, Louisiana, and Mississippi.

E. O. Buck, *Vice President, Oil Loan Department.*

THE NATIONAL BANK OF

COMMERCE

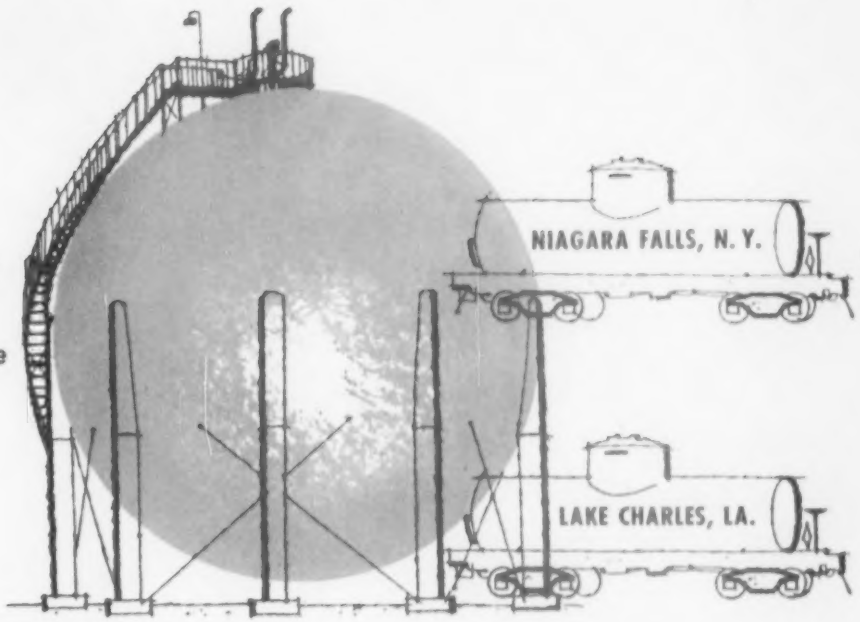
OF HOUSTON *Gulf Building — 712 Main Street, Houston, Texas*

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

multi-plant production

skilled technical service

traditional quality



BUY AMMONIA to better advantage from MATHIESON

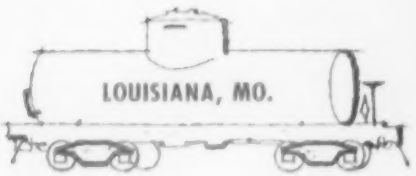
Require dependable deliveries of ammonia . . . coordinated with your production schedule? It will pay you to order from Mathieson. Here's why:

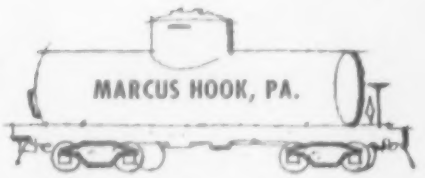
Five shipping points assure maximum protection against supply interruptions.

Expert technical service . . . particularly in the pulp and paper and metals processing fields . . . is always available.

Balanced output to industry and agriculture eliminates seasonal shortages.

Talk over your ammonia requirements with an Olin Mathieson representative soon. Let him show you why more people buy more chemicals to better advantage from Olin Mathieson . . . America's prime producer of basic industrial chemicals.





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MATHIESON CHEMICALS

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INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

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ORGANIC CHEMICALS: Ethylene Oxide • Ethylene Glycols • Polyethylene Glycols • Glycol Ether Solvents • Ethylene Dichloride • Dichloroethylether Formaldehyde • Methanol • Sodium Methylate • Hexamine • Ethylene Diamine • Polyamines • Ethanolamines • Trichlorophenol • Trichlorobenzene

Enjoy the

STANDARD SCHOOL BROADCAST

with your children

Each Thursday, you and your children can hear the world's beautiful music come thrillingly alive over your radio.

Oldest educational program on the air, the Standard School Broadcast today features a symphony orchestra, conducted by Carmen Dragon, together with choral groups, a dramatic cast and famous guest soloists.

Its goal is to help Western children gain an absorbing new interest in music, and—through music—a broader understanding and knowledge of the world around them.

You'll enjoy hearing the Standard School Broadcast's fine music at home...and discussing it with your children to give you one more valuable link with their interests.

See your newspaper radio log for time and station.

Presented by

STANDARD OIL COMPANY OF CALIFORNIA

at CF&I Seamless Mill

precision threading is checked microscopically

The job requirements for deep wells demand high strength pipe, and the strength of the threaded connection is in proportion to the body of the pipe. Thus, threading is a critical operation in the production of seamless casing and tubing.

At the new CF&I Seamless Mill at Pueblo, Colorado, the pipe is always rolled to an O.D. large enough to insure a good, full thread. The pipe is precisely threaded by automatic machinery of the most modern design. After this operation, CF&I and customer inspectors meticulously gauge the thread lead, taper, height and size. Then the thread is checked with a thread contour microscope, an instrument that determines absolute accuracy of thread angle and form. Finally, thread lubricant is applied to all threads, the couplings are bucked on power-tight and thread protectors are put on both ends of the pipe.

CF&I Seamless Oil Country Casing and Tubing meet API STD 5A specification and are available in sizes from 2⅜" through 9⅝" O.D. CF&I has complete control of the quality of the materials it uses, and production is carefully supervised through every step of manufacture to make sure that CF&I products meet the exacting requirements of the petroleum industry.

SEAMLESS TUBULAR PRODUCTS

THE COLORADO FUEL AND IRON CORPORATION

Denver, Colorado

CF&I

B205

Oilmen—Seamen . . . Here's a group of men who can make water cooperate with oil. They spend a good part of their lives with a 150,000-barrel load of petroleum under them and a full depth of ocean under that. For they are Texaco tanker men. They have to know their seamanship from A to Z and their complex cargo just as well: how to load it and discharge it, and protect it all the way. Their skills are an important reason why Texaco products are always available to fill the ever-increasing demand.

The Texas Company

TEXACO

SUPER Rib-Top V-Belts ...for toughest drives in drilling industry

Readily available from your oil field supply house are Gates Super Rib-Top Belts—V-belts designed to handle the toughest mud pump drive problems you have. Problems like these—

Limited Space: On mud pumps where space is a problem, the greater horsepower capacity of Rib-Top Vulco Ropes permits fewer belts, narrower sheaves.

Over-loads: For any drilling rigs, where it may be necessary to run mud pump drives over their rated capacities, Gates Super Rib-Top Vulco Ropes easily carry the extra load.

4 Engineering developments make Rib-Top world leader

Super tough cords:
Provide 40% greater horsepower capacity...easily absorb tremendous shock loads.

Stabilizing Ribs:
(U.S. Pat. No. 2548135) dampen vibration; protect top of belt. On idler-equipped mud pump drives, ribs keep belt running smoothly over idler.

Concave Sidewalls:
(U.S. Pat. No. 1813698) provide sure pulling power, longer wear because sides straighten out as belt bends—make even contact with sheave (Fig. 1). (Straight-sided belts bulge out when bent (Fig. 2). Uneven contact causes uneven wear).

Flex-weave Cover:
(U.S. Pat. No. 2519590) provides greater *flexibility* with far less stress on fabric. Cover wears longer—increases belt life, lowers belt costs.

Carries 40% Greater Load

For all really *tough applications*—to get longer, more satisfactory service—you can count on the 40% greater horsepower capacity...extra resilience...and oil and heat resistance of Gates Super Rib-Top V-Belts. Quickly available from oil field supply houses. The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-belts.*

Gates®

The mark of *specialized* research

TPA 43

SUPER Rib-Top Vulco Rope

The V-belt with 40% more horsepower capacity

THE STRONGEST WIRE
MAKES THE STRONGEST ROPE...
THAT'S WHY ONLY 1105 IS USED IN

ROEBLING

Royal Blue

WIRE 1105 ROPE

1105 WIRE is the strongest and toughest rope wire that has ever been developed.

Royal Blue is a new all-steel wire rope. It's made of 1105 wire—stands up in service—gives you more for your money because it has more to give.

Ask us for the full facts about Royal Blue Wire Rope, or contact your Roebling distributor.

ROEBLING

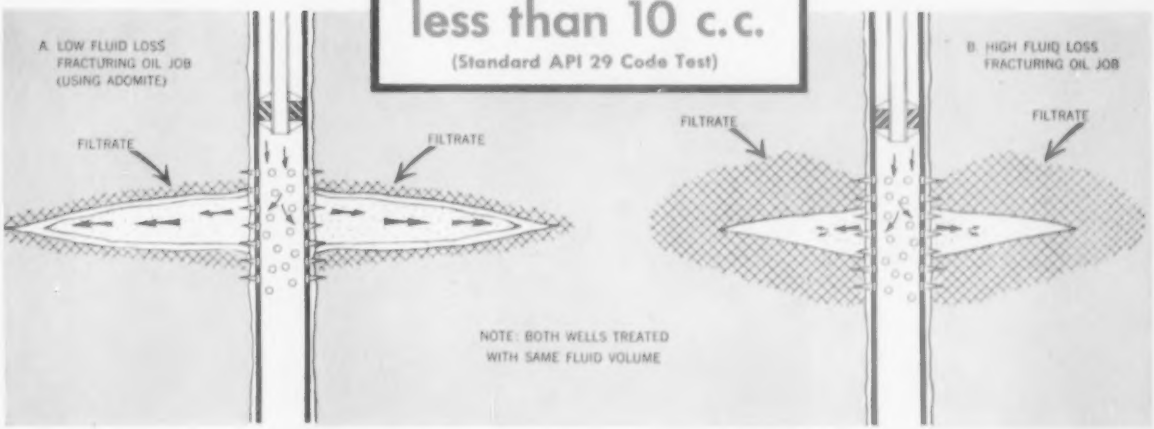
Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 5563 FREDONIA AVE. • CLEVELAND, 13235 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST. AVE. S. • TULSA, 321 N. CHEYENNE ST.• EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

For more productive fracturing . . . least fluid loss

specify Adomite*

Cuts fluid loss to less than 10 c.c.
(Standard API 29 Code Test)


A. LOW FLUID LOSS FRACTURING OIL JOB (USING ADOMITE)
FILTRATE
FILTRATE
B. HIGH FLUID LOSS FRACTURING OIL JOB
FILTRATE
FILTRATE
NOTE: BOTH WELLS TREATED WITH SAME FLUID VOLUME

Adomite is the remarkable fluid-loss control additive that is building production and profits virtually everywhere it is used. Very small amounts of Adomite reduce the API fluid loss of lease crudes to 10 c. c. at most reservoir conditions. With gelled crudes, even smaller quantities are required. *Easy to use*, Adomite is a dry material in flake form that is mixed directly into the crude or gelled crudes on the lease. Only standard mixing equipment is required.

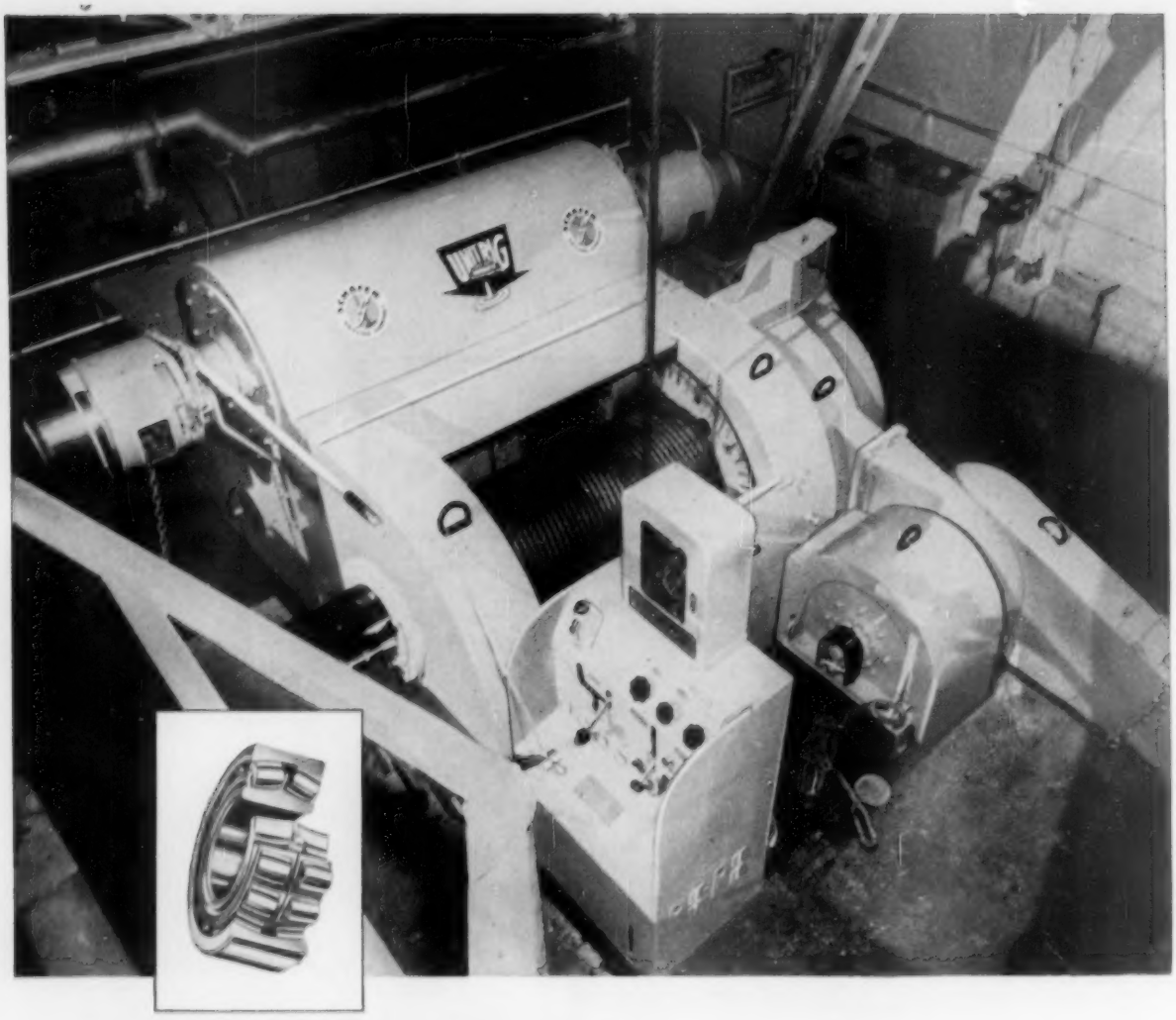
*Trade-mark, Continental Oil Company

Only Adomite can do so many things so effectively . . .

- Seals the fracture face—minimizes fluid loss.
- Longer fractures—deeper penetration of sands.
- Greater sustained production with a given fluid volume at lower cost.
- Saves you money—utilizes lease crudes—less pumping.
- Cleans up quickly—does not contaminate produced oil or the formation.
- Fewer "Sandouts."
- Profitably used for "drilling in" and "work overs."

© 1956, Continental Oil Company

Be sure to specify Adomite on your next fracture job



21 SKF Spherical Roller Bearings Are 21 Good Reasons for...

UNIT RIG'S PEAK CAPACITY AND MOBILITY

The Unit Rig & Equipment Company, Tulsa, Okla., wanted its new Model U-40 Draw Works to be exceptionally portable. They also wanted the capacity to handle hook load and speeds of from 694,000 lbs. at 25 ft./min. to 26,000 lbs. at 476 ft./min. To help accomplish both these laudable purposes, Unit Rig specified SKF Spherical Roller Bearings for 21 locations on drum shaft, input shaft, countershaft, jackshaft, rotary countershaft, and cat shaft.

The greater capacity, size for size, of SKF Spherical Roller Bearings helped Unit Rig to build maximum capacity into a rig of compact and portable design. The design of the SKF Spherical Roller Bearing makes it inherently self-aligning. The bearing's full capacity is always available for useful work. The design and proportion are such that in addition to heavy radial load the SKF Spherical Roller Bearing supports heavy thrust load in either direction.

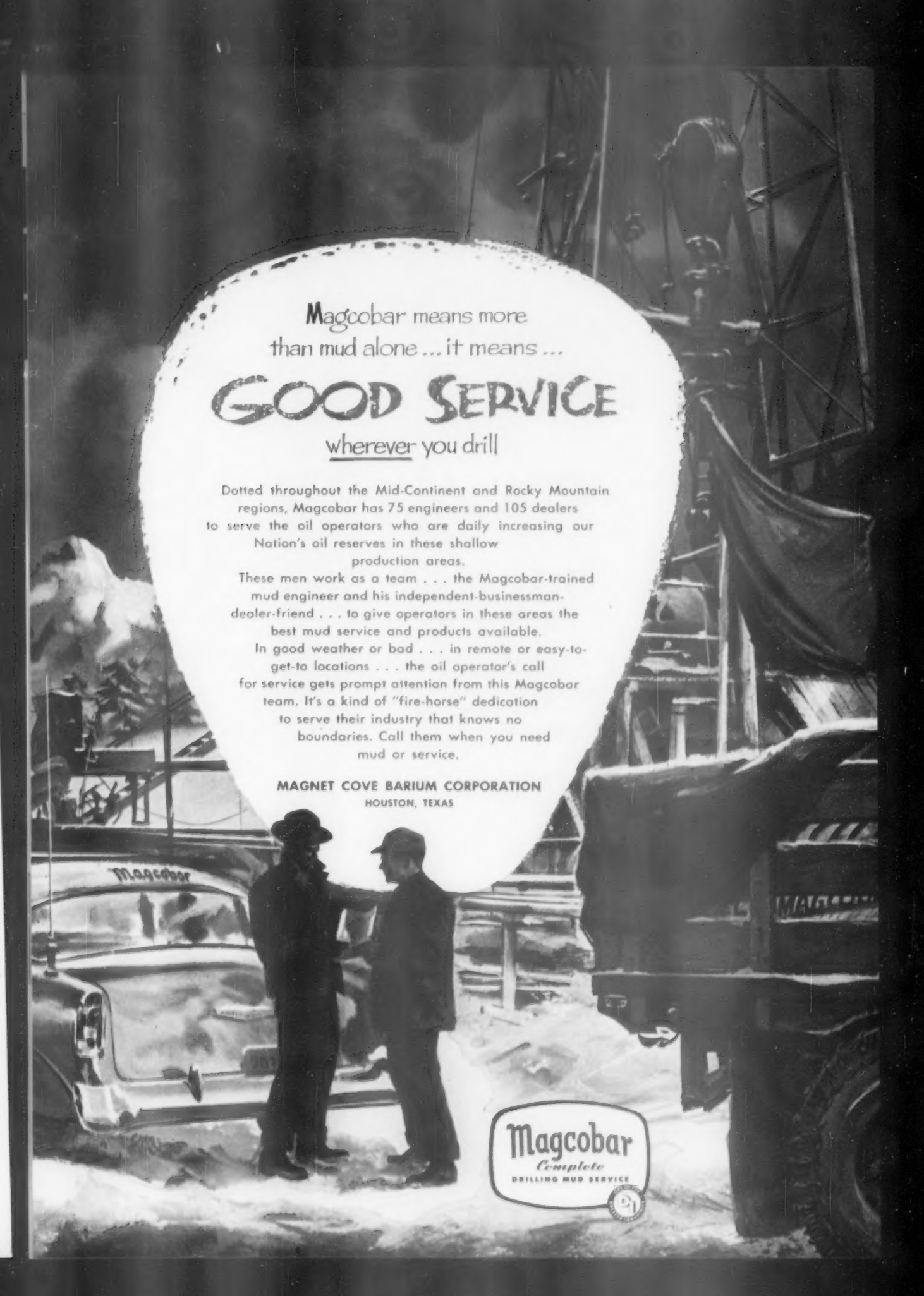
Better bearings are the reason that wherever you find men drilling for oil, you're likely to find SKF bearings – doing a dependable job. 7641

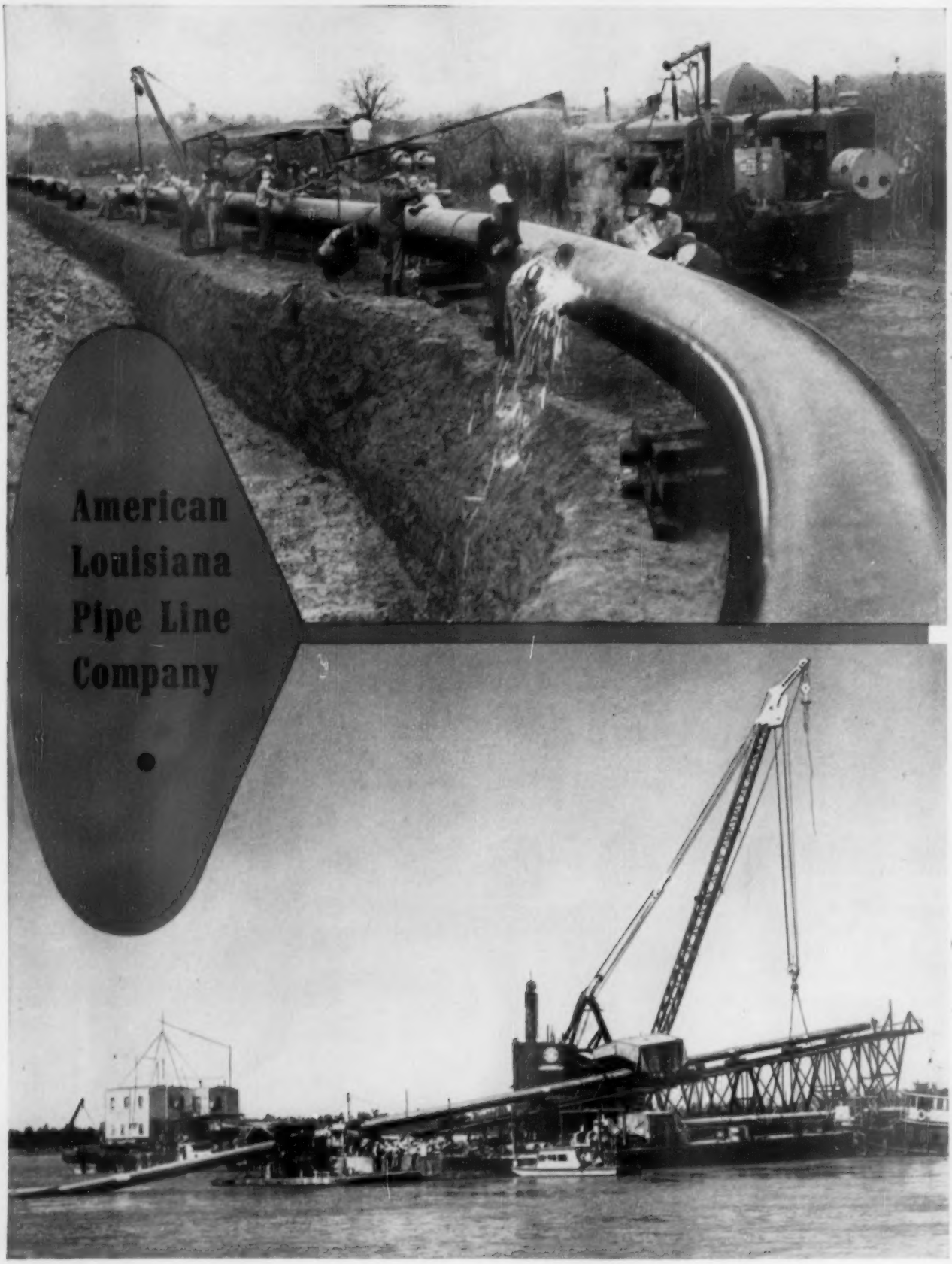
SKF Spherical Roller Bearings in the Model U-40
drum shaft 4 • jack shaft 3
countershaft 4 • rotary countershaft 3
input shaft 4 • cat shaft 3

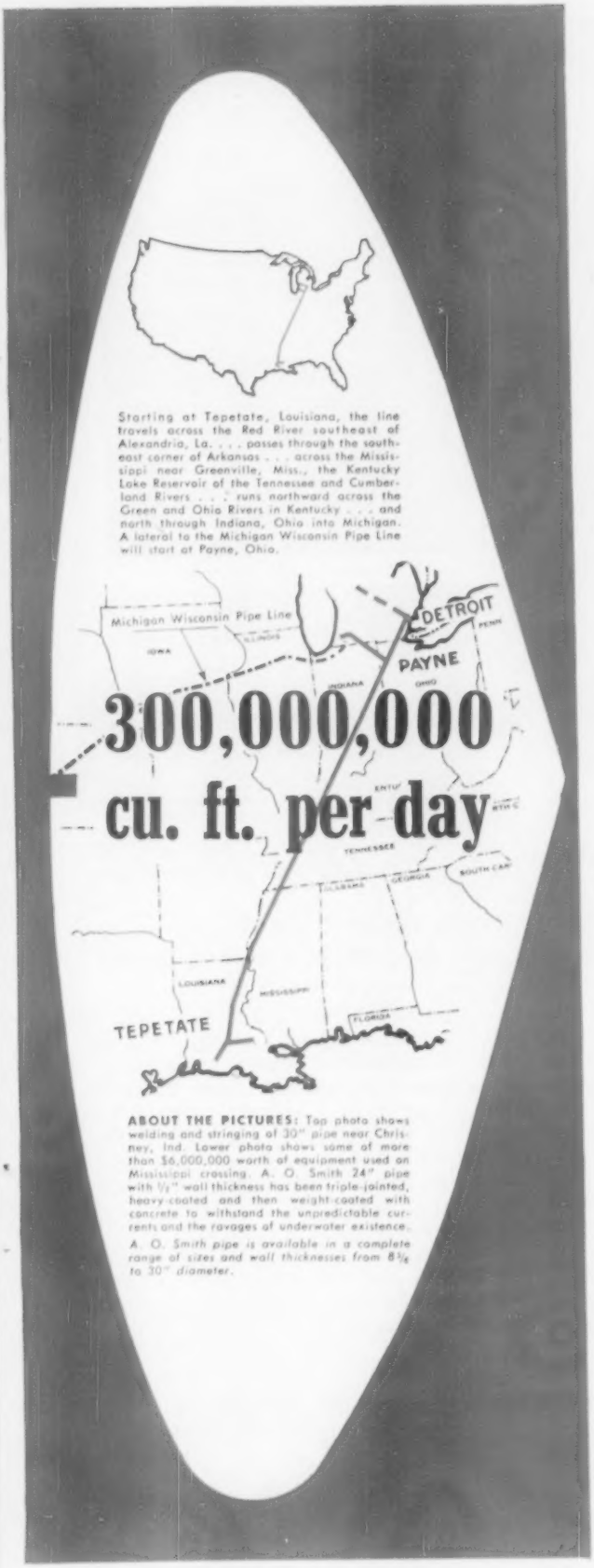
SKF®

BALL AND ROLLER BEARINGS

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.,
manufacturers of SKF *and* HESS-BRIGHT® *bearings.*


Magcobar means more
than mud alone ... it means ...
GOOD SERVICE
wherever you drill
Dotted throughout the Mid-Continent and Rocky Mountain regions, Magcobar has 75 engineers and 105 dealers to serve the oil operators who are daily increasing our Nation's oil reserves in these shallow production areas.
These men work as a team . . . the Magcobar-trained mud engineer and his independent-businessman-dealer-friend . . . to give operators in these areas the best mud service and products available.
In good weather or bad . . . in remote or easy-to-get-to locations . . . the oil operator's call for service gets prompt attention from this Magcobar team. It's a kind of "fire-horse" dedication to serve their industry that knows no boundaries. Call them when you need mud or service.
MAGNET COVE BARIUM CORPORATION
HOUSTON, TEXAS
Magcobar
Magcobar
Complete
DRILLING MUD SERVICE


American
Louisiana
Pipe Line
Company


Starting at Tepetate, Louisiana, the line travels across the Red River southeast of Alexandria, La. . . . passes through the southeast corner of Arkansas . . . across the Mississippi near Greenville, Miss., the Kentucky Lake Reservoir of the Tennessee and Cumberland Rivers . . . runs northward across the Green and Ohio Rivers in Kentucky . . . and north through Indiana, Ohio into Michigan. A lateral to the Michigan Wisconsin Pipe Line will start at Payne, Ohio.
Michigan Wisconsin Pipe Line
DETROIT
PAYNE
300,000,000
cu. ft. per day
TEPETATE
ABOUT THE PICTURES: Top photo shows welding and stringing of 30" pipe near Chrisney, Ind. Lower photo shows some of more than $6,000,000 worth of equipment used on Mississippi crossing. A. O. Smith 24" pipe with ½" wall thickness has been triple-jointed, heavy-coated and then weight-coated with concrete to withstand the unpredictable currents and the ravages of underwater existence.
A. O. Smith pipe is available in a complete range of sizes and wall thicknesses from 8⅝ to 30" diameter.

793 Miles of A. O. Smith Line Pipe

THE new American Louisiana Pipe Line is being built to meet the tremendous requirements for additional supplies of natural gas in Michigan, Wisconsin and parts of Iowa and Missouri. When complete it will bring 300,000,000 cu ft of gas per day to these states. This capacity can be increased to 550,000,000 feet per day by the addition of compressor horsepower.

The main line will be 30" in diameter and extend 1000 miles from southern Louisiana to a connection with Michigan Consolidated Gas Company at Willow Run. It will cross 8 states and nine major rivers and lakes, marshes, swamps, rice fields, forests and the mountains of Tennessee, Kentucky and southern Indiana. Also, approximately 78 miles of 24" and 26" main line will be laid in southern Louisiana.

The pipe line system was designed by Ford, Bacon & Davis, Inc., and construction is being done by H. C. Price Company, Houston Construction Company and Brown & Root, Inc.

A. O. Smith Corporation played an important part in this new line by furnishing 758 miles, over 75%, of the 30" pipe from its Houston Mill, A. O. Smith Co. of Texas, and 35 miles of the 26" pipe, together with the 24" heavy wall pipe used for the major river crossings, from its Milwaukee Mill.

For almost 30 years A. O. Smith has held a high-standard of quality control and this quality control has been maintained at every step of the manufacturing process. That's why A. O. Smith pipe made and installed in 1928 is still in operation. That's why so much A. O. Smith pipe has been used in nearly every important high pressure line.

Through research . . . a better way

A. O. Smith
CORPORATION

TUBULAR PRODUCTS DIVISION
Milwaukee 1, Wisconsin

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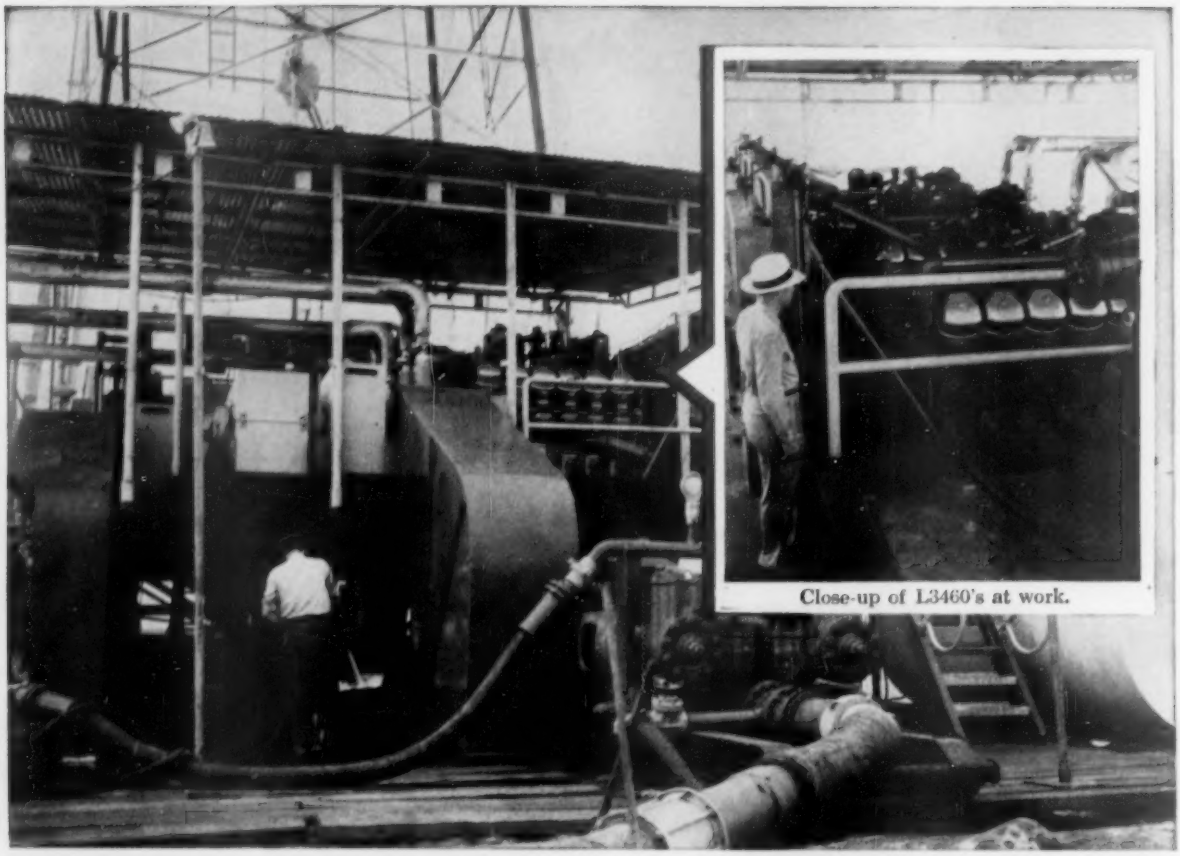
International Division: Milwaukee 1, Wisconsin



Close-up of L3460's at work.

Here's the Way to Power a Rig... for Deep Holes!

...use LeRoi L3460 or L4000 V-12 drilling engines to get the outstanding acceleration and lugging power you need for faster round trips

If you have an engine that can stand the gaff on deep holes — you have an engine that can help you bottom any hole at lower cost.

The L3460 and L4000 can do just that. It's been proven time and time again.

Let's look at the L3460. It develops 600 hp maximum. On one rig two of these engines hoisted 5-inch pipe from 8300 feet in just two hours — and this was a wet trip. That's proof of both acceleration and lugging power.

The L4000 is the L3460's twin except for displacement. It produces 655 maximum hp. Both engines are only 164 inches long so that they have the compactness that helps you keep to overall width and weight limitations. And they're built to stand oil-field handling.

Not only do you get more horsepower per dollar from these V-12's, but you also get these important features: Short-stroke design that gives you greater horsepower and speed, without compromising engine life. Wide speed range up to 1350 rpm. Operation on oilfield fuels —natural gas or butane. Conservative rating. Lightweight pistons, hydraulic tappets, short-radius rotating parts, and sensitive controls to provide hair-trigger response to load demands.

Yes, you can drill them deep and drill them fast with L3460's or L4000's. Let your supply house or Le Roi distributor show you why. If you want descriptive literature, just write us for it.

P-136

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

PORTABLE AIR COMPRESSORS · TRACTAIR · STATIONARY AIR COMPRESSORS · AIR TOOLS · ENGINES

DU PONT

PETROLEUM CHEMICALS DIVISION NEWS

DU PONT

March ★ One of a Series of Interest to the Petroleum Industry ★ 1956

Question Box

1. ARE YOU having trouble keeping costs down as octane ratings go up?
   The new Du Pont service described at right can help you with this problem.
2. DO FOULED heat exchangers plague you with costly downtime and spoiled product?
   Du Pont FOA-2 may help solve this problem.
3. IS THERE A DANGER of additive extraction when fuel oils pass through dehydrators?
   The next page has an article on this subject.
4. WHO can help you get the highest octane at the lowest refining cost?
   See next page.

FOA-2 reduces heat exchanger fouling—helps keep process unit on stream longer

Fouled heat exchangers cost time and money and premature process unit shutdowns.

Du Pont Fuel Oil Additive No. 2 (FOA-2) promises relief from this frequent and troublesome problem.

A little does a lot

Fouling due to unstable stocks such as coker distillates can be minimized by adding FOA-2 in concentrations of as little as 20 to 30 lbs. per 1,000 barrels. It should be added at the beginning of the processing run.

In cases where the heat exchanger fouling is severe enough to cause shutdowns as often as every few days, this treatment will generally extend, to as much as a month or two, the period between shutdowns. And during this extended operating time, FOA-2, as a result, will help to reduce the loss in heat transfer coefficient.

Useful in pipelines, too

Another effective application for FOA-2 is for cleaning pipelines. In concentrations of 50 lbs./1,000 barrels, in No. 2 distillate, it does an excellent job of keeping the contamination in suspension and removing it in advance of the new product.

Why not try it? Its rapid, thorough cleaning will mean lines that are free of contamination and ready for clean product service immediately.

Other uses

Du Pont Fuel Oil Additive No. 2 was originally developed as a stabilizer and dispersant for home heating oils. As such, it does a highly efficient job of preventing and dispersing sludge formations that cause screen and filter clogging.

In addition – being a nonmetallic *ashless* additive – it does not leave a metallic ash deposit which can foul the operation of the electrical system. Thus, it helps to prevent ignition failures that cause customer dissatisfaction and wasteful service calls.

In diesel fuels, the excellent dispersant action of FOA-2 improves filterability. In this way, it helps to eliminate most injector-sticking and filter-plugging problems.

THIS DU PONT TECHNICAL SERVICE MEANS...

More octane numbers per dollar

Octane requirements are increasing so fast that many refiners are facing the choice of either a squeeze on their profits or an advance in their gasoline price. This predicament is brought about by the pyramiding costs of each octane number increase in the 90 to 100 range. In this connection, there are times when a refinery technologist experienced in this specialized field may be of considerable help in the control of costs.

Jack S. Bellah, a Du Pont refinery technologist, is shown here discussing a more economical method of obtaining octane numbers.

The Du Pont Petroleum Chemicals Division is glad to offer you the services of such specialists. The value of their services has been proven in a number of refineries during the past year.

Based on market requirements

Unfortunately, most refiners are forced to do a certain amount of uneconomical processing in order to balance their particular market requirements. But this does not mean that substantial savings in processing cannot be realized – by carefully analyzing and adjusting *all* the factors influencing octane costs.

These factors include the particular gasoline blend, the octane level under consideration, and OVER

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

CONTINUED *Octane Economy*

the method of achieving this desired level. These factors, and their relation to each other, will vary with each individual refining operation. Also affecting the octane cost are the spread in value between intermediate fuels immediately adjacent to the gasoline fraction, and the flexibility of the market between these fuels and gasolines.

Tailored to your operations

For these reasons, the Du Pont *octane economy service* also takes into consideration all the market factors which influence your refining operations. Then a thorough study of the actual processing operations is made to determine the most economical course for reaching your desired octane requirements.

How it's done

Assuming that catalytic reforming is today the principal processing variable in gasoline quality control, then the method of operating the reformer determines to a large extent the cost of achieving a desired octane level.

For maximum economy

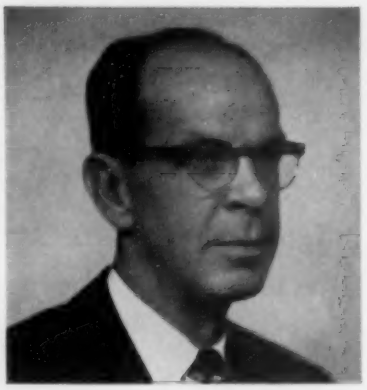
At all octane levels, the most economical cost results when the optimum combination of catalytic reforming operations and tetraethyl lead dosages is used. In some instances the maximum usage of TEL, 3.0 cc per gallon might be more economical than increasing the severity of the reforming operation. But this is by no means always true. Generally a combination of moderately severe reforming conditions, commensurate with the octane requirements of the existing market situation, and intermediate TEL dosages result in the lowest possible costs.

Valuable aid

By determining the most economical processing steps and reforming severity, in relation to your own individual stocks and market requirements, the Du Pont *octane economy service* can provide a most valuable aid to your own process engineering.

If you would like more information about this service and how it can help you maintain your profit margins, just drop us a line.

HEADS DU PONT OCTANE ECONOMY SERVICE



Jack S. Bellah joined the Petroleum Chemicals Division as Refinery Technologist in 1953. A graduate of the University of Tennessee with a B.S. degree in chemical engineering, he completed a year of study under a T.V.A. chemical engineering scholarship.

For six years, he was employed by the Socony-Vacuum Oil Company. His activities ranged from routine control testing through heavy oils blending, conservation engineering, operations control and equipment testing, unit yields and economic studies, process engineering and product development.

He then joined Mathieson Alkali where he was engaged in chemical engineering development work.

In 1946, he became a process-project engineer at Stanolind Oil and Gas Company in Tulsa. After working on two of the large joint venture gasoline plant projects in West Texas, he joined the Refinery Engineering Company in Tulsa in 1950. There he coordinated all the company's process activities and economic studies.

Do dehydrators remove Du Pont FOA-2 from distillate fuels?

Laboratory and field tests prove the absorption rate is *less than 1%*. And the negligible amount absorbed does not interfere with the water removal efficiency of the bauxite dehydrators.

For example

In a field test, 74,000 barrels of a No. 2 distillate fuel oil were treated with 18.8 pounds of Du Pont Fuel Oil Additive No. 2 per 1,000 barrels. This stabilizer and dispersant was injected into the circulating line of the storage tank while the fuel was being recirculated. The storage tank contained 8 inches of water. Since the fuel was destined for shipment through a pipeline, a dry fuel was desired.

The treated fuel was pumped from the storage tank through two 100-barrel capacity bauxite dryers operating in parallel, then into the pipeline. Each dryer contained sixteen tons of bauxite.

The test fuel was sampled before and after the dryers . . . and at regular intervals throughout the 31-hour shipment.

Results

The fuel was bright and dry when it left the dehydrators. The FOA-2 content of fuel entering and leaving the dryers was equal. It remained uniform throughout shipment.

When the fuel was checked in at destination, no loss in stability was noted and in this respect the fuel proved to be superior to the base fuel without additive.

DU PONT
REG. U.S. PAT. OFF.
Better Things for Better Living
. . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.) *Petroleum Chemicals Division* • *Wilmington 98, Delaware*

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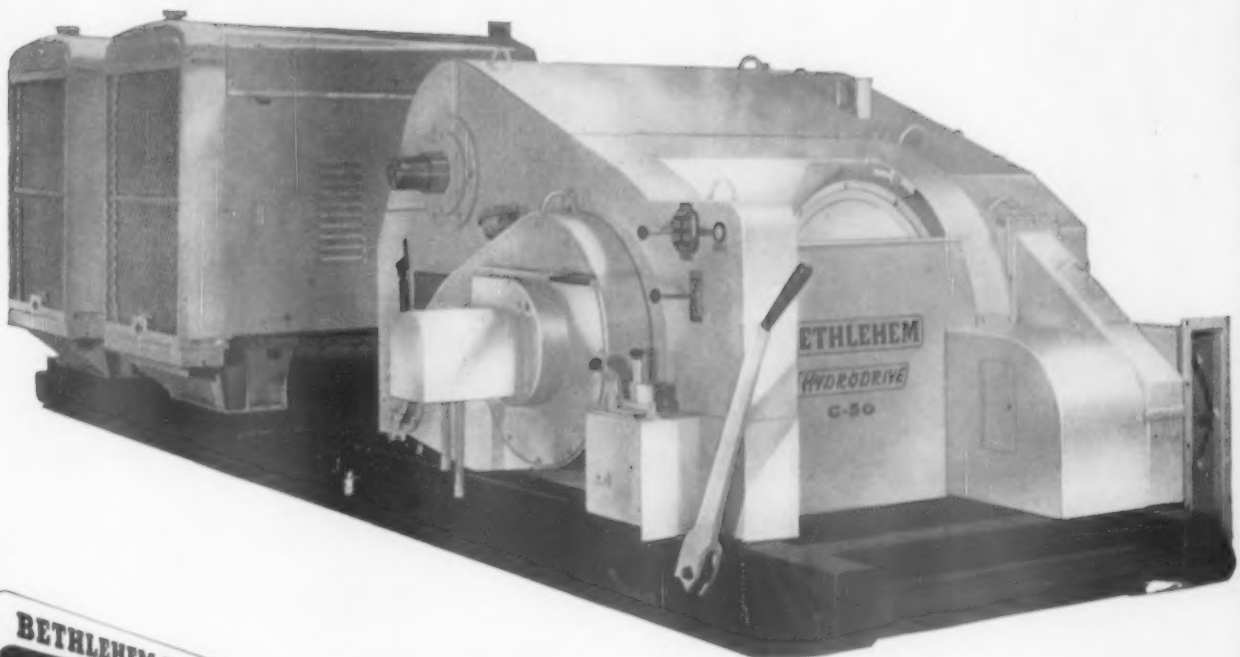
A-989

Printed in U. S. A.

THE BETHLEHEM C-50

A Smooth, Fast, High-Capacity Rig for Shallow-to-Medium Depths



Here's a rig that completely answers every demand in the shallow-to-medium drilling range. It's Bethlehem's new C-50, the Hydrodrive drawworks with smoothness, speed, and capacity all wrapped together in one neat package.

This is a rig with torque-converter drive—a drive that cushions all shocks, protects vital working parts, and automatically adjusts speeds for any given load. It is a drive that makes possible faster trips and provides complete control for drilling operations. The torque-converter can be engine-mounted or placed amidship, whichever you choose.

Other C-50 features are equally outstanding. This is a rig that is built to stand the gaff. Parts are extra-heavy, extra-strong. The unit has short, rugged shafts, sturdy roller bearings, oil-bath chain drives, high-capacity air-friction clutches, and oversized brakes. The brakes are fully water-cooled by a forced-circulation system.

Optional items include upper drum, hydromatic brake, and gear-type reverse. An intermediate forward speed (making three in all) can be substituted for the reverse drive. This third speed is especially advantageous whenever slush-pump drive is furnished with the compound.

Though the C-50 is built for the heaviest service in its drilling range, it is designed for easy moving. Low and very compact, it is readily adaptable for trailer mounting. It is equipped with skids when a conventional installation is desired.

You are invited to study this rig and its many excellent features. If you will call or write, we will gladly go over it with you, point by point.

BETHLEHEM SUPPLY

BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second St., Tulsa, Okla.

West Coast Headquarters: Los Angeles, Calif.

Export Distributor: Bethlehem Steel Export Corporation
25 Broadway, New York, N. Y.

This Easy Handling Hose Assures You Safer Drilling—at Lower Cost!

The Manhattan method of applying high-tensile steel cable wires under precisioned tension gives Ray-Man CBL Rotary Hose a degree of strength plus flexibility—and safety—never before equalled. Ray-Man CBL Rotary Hose also has unusual resistance to kinking or accidental crushing. This strength and flexibility are achieved without bulk. Therefore, it is easier to rig-up without accident . . . it holds steadier in the derrick without whipping—even under the high pressures of deep drilling. The result: Your drilling costs are cut because you get longer, trouble-free service.

Long-life and safer, easier handling are also insured by Manhattan's streamlined, built-in hose coupling. It is equipped with a special leak-proof "Lip-Lok" seal that tightens under pressure to prevent costly blow-outs. This hose coupling has no protruding lugs or flanges—nothing to cause fouling or damage on the job.

Bulletin #6743 describes other features which add up to the highest safety factor, longest life and lowest cost per foot drilled . . . "More Use per Dollar" . . . with Ray-Man CBL Rotary Hose.

RM-614

R/M

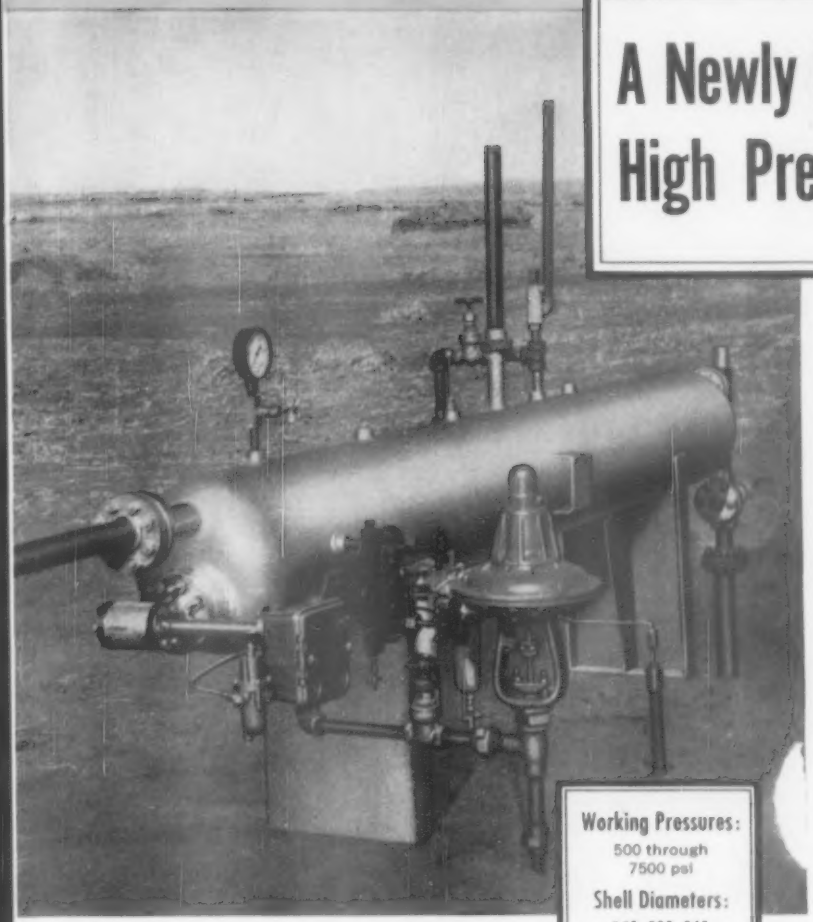
MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls

Introducing...

A Newly Designed Horizontal High Pressure Separator...



Working Pressures:
500 through 7500 psi

Shell Diameters:
16", 20", 24", 30", 36", 42".

It's BS&B's New Single Barreled Model DC!

The exclusive internal design of the new BS&B Model DC Separator has been developed as the result of extensive laboratory and field testing, and is considered to be a substantial improvement over that of any other horizontal separator available today.

Within its single horizontal cylinder the Model DC provides a large gas-liquid separation chamber, a large liquid collecting and surge chamber, and a highly efficient mist extraction section.

FEATURES

1. Separation Efficiency. Model DC utilizes a highly efficient inlet deflector as a primary separating element and combines a turbulent-free separation section with an efficient mist extractor section to remove liquid particles 10 microns in size and larger.

2. High Capacity. Dual gas and liquid chambers in a single barrel provide a large surge capacity.

3. Maximum Release of Solution Gas. Maximum liquid retention and large liquid surface area permit maximum release of solution gas.

4. Cold Weather Operation. The internal design of the Model DC gives excellent cold weather operating characteristics.

5. Sensitive Controls. Model DC utilizes the excellent BS&B Type 889 Liquid Level Controller with the BS&B Type 1450 Pilot, which has throttling and snap action range and gravity adjustments. The displacement element is located in the turbulent-free liquid chamber to effect constant interface level.

6. Convenient Hook-Up. All of the controls are located at one end and on the same side of the separator for convenience and neat appearance.

For detailed information on the BS&B Model DC Separator, contact your BS&B Representative, or write to...

EFFICIENCY
OVER 60 YEARS
BS&B
RELIABILITY
ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

BLACK, SIVALLS & BRYSON, INC.

Oil & Gas Equipment Division, Dept. 1-A3
1708 West Main Street Oklahoma City, Oklahoma

an ACCO product

American Cable TRU-LAY VHS | 15% STRONGER

This Reel Means Safer, Faster Drilling

You're seeing this reel, with its proud VHS label, at more and more rigs in every section of the oil country. For drillers are learning that new VHS rotary lines, made from a new grade of steel for Wire Rope, possesses important advantages.

To begin, VHS is at least 15% stronger than Improved Plow Steel—the best grade available, before VHS.

Higher Safety Factor

This additional strength means a higher safety factor. For example the safety factor for 10 lines of VHS is about equal to the factor of safety for 12 lines of IPS. Or, the factor of safety for 10 lines of VHS is 14.9% or 15% higher than for 10 lines of IPS.

Drill Faster—Cut Down Time

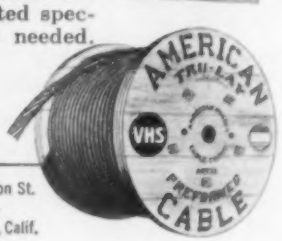
With stronger VHS you can drill deeper before increasing the number of parts of line. You can make round trips faster. And VHS's extra strength eliminates, in many cases, any necessity for regrooving sheaves or buying new blocks to use larger diameter lines for higher safety factors.

Tougher, Too!

VHS is not only stronger, it's tougher. And this combination of extra strength and toughness gives it higher resistance to abrasion and greater resistance to peening . . . both important factors in maintaining rope diameter and shape. If regular adaptable cut off practices are followed, ton mile advantages should result.

Easy to Order

To order VHS drilling line just call your nearest Mid Continent Supply Store and tell them the length and diameter you want. No complicated specifications needed.



For further information write to the nearest American Chain & Cable Company office listed at right for
Brochure DH-516H

ACCO
TRADE MARK

American Cable Division
AMERICAN CHAIN & CABLE

630 McFarland St. | Houston 1, Texas
4555 E. 46th Ave. | Denver 16, Colorado
2216 S. Garfield Ave. | Los Angeles 22, Calif.
400 W. Madison St. | Chicago 6, Ill.

Wilkes-Barre, Pa.; Odessa, Texas; New York, N.Y.; Philadelphia, Pa.; San Francisco, Calif.

Cut interference, save air time, multiply radio usefulness with new General Electric Personal Channel selective calling systems

New Progress Line Personal Channel Systems provide two-way radio users with individual calling, automatic recall or "leave a call"—make possible group calling with personal communication between dispatcher and driver after the call is placed.

Your two-way radio dispatcher can call or signal your drivers individually, with a new G-E Personal Channel selective calling system. He pre-selects the individual driver to be called or signalled by means of push buttons. Transmissions, with or without the electronic tones which provide the individual calling or signalling function, are made by pushing either of two push bars on a desk console.

With G-E Personal Channel individual calling built into two-way radio systems, dispatchers can call each driver—drivers need hear only calls beamed to them. Away from vehicles, drivers may automatically be recalled to the radio by a flashing light or sounding horn. If beyond range of the recall message, a signal automatically remains lighted on the radio control unit until the call is answered.

With a fleet equipped with Personal Channel group calling, drivers hear only calls from their own dispatcher. When the individual called answers the dispatcher, conversations then may become private.

New Progress Line Personal Channel Systems, for individual or group calling, effectively eliminate most of the nuisance interference due to crowded channel conditions. Both systems virtually eliminate bothersome "skip" interference from distant stations.

Present users of G-E all-electronic selective calling systems report increases up to one-third in useful air time. The ability to recall, or "leave a call", saves air time previously wasted when dispatchers repeated calls for drivers away from their vehicles.

NEW DEPENDABILITY

New G-E Personal Channel Selective Calling Systems now provide the highest possible reliability of operation. A new, simplified, electronic tone receiver selects proper tones in a more exacting manner than ever before. Limits within which the receiver will accept proper tones are dependent upon BOTH amplitude and frequency. The tones accepted must have the right amplitude as well as the right frequency.

Operating ranges of present two-way radio systems are not impaired by the addition of Personal Channel Selective Calling Systems.

All Personal Channel equipment can be incorporated within a single Progress Line mobile unit case, with the same cost-saving, interchangeable plug-in chassis feature provided in all Progress Line equipment.

Your General Electric Communications Counselor is ready now to recommend the G-E Personal Channel two-way radio system which will best serve you. For more information call him, or write: *General Electric Company, Communication Equipment, Section X836-5, Electronics Park, Syracuse, New York.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

At a huge new sports stadium in Minnesota...

"SCOTCHRAP" rolls on easy ...even in zero weather!

"Scotchrap" conforms smoothly, handles easily at high or low temperature — and the pressure-sensitive adhesive sticks tight, too — even at 0°-10°F!

Johnson, Drake & Piper, Inc., General Contractors on the new Metropolitan Sports Stadium near Minneapolis, Minnesota, prefer "Scotchrap" Brand Pipe Insulation for these reasons — and many more. You see, there's no danger when applying "Scotchrap". No special equipment is needed. Just roll it on, and corrosion is sealed out.

"Scotchrap" is a tough vinyl plastic tape that resists abrasion above or below ground, resists galvanic and electrolytic action, resists damage from oil, water, acids, alkalies, weathering and sunlight. *Make sure you get the tape with the green adhesive.*

Sold by the square in 1", 2", 4", 6" and 8" widths — 100-foot rolls. Order a supply today!

REG. U.S. PAT. OFF.

SCOTCHRAP Pipe Insulation

BRAND

The term "SCOTCHRAP" is a registered trademark of Minnesota Mining and Manufacturing Company, St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

Pump keeps working, oil keeps coming with TIMKEN® bearings on the crankshaft

THIS Worthington VTE-2 Plunger Pump has to inject water under pressure into oil-bearing sands to revitalize the well and keep oil coming. It's a 24-hour-a-day job, day-in, day-out. The pump mustn't stop for any reason. To keep it on the go with unattended operation, Worthington engineers mounted the crankshaft on Timken® tapered roller bearings, got maximum efficiency, prevented costly well shutdowns.

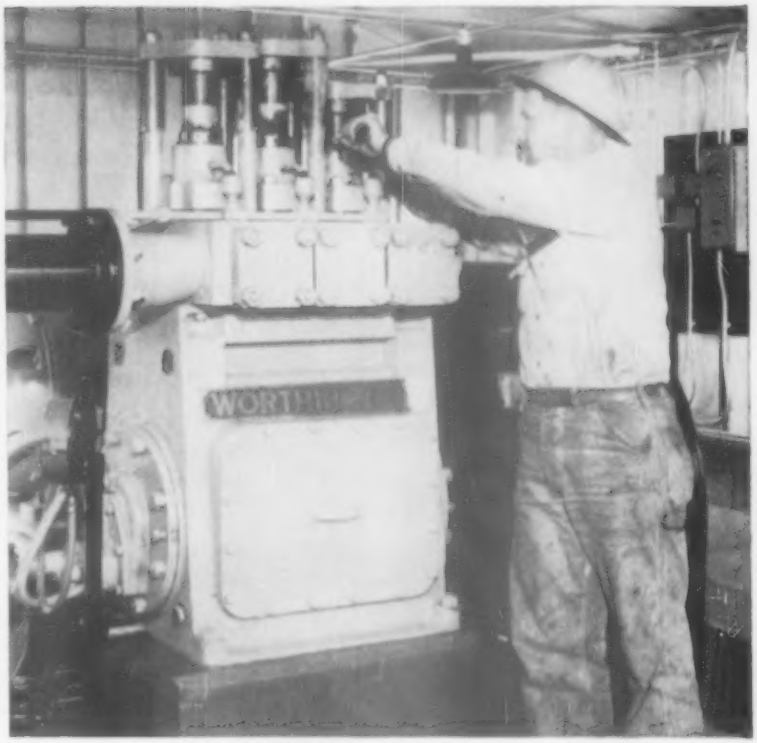
Because of their tapered construction, Timken bearings take both radial and thrust loads in any combination. The crankshaft is held in positive alignment. Wear on crankshaft and adjacent parts is sharply cut. The pump keeps working steadily, dependably. And because Timken bearings keep housings and shafts concentric, closures are more effective. Dirt's kept out, lubricant in, maintenance is reduced to a minimum.

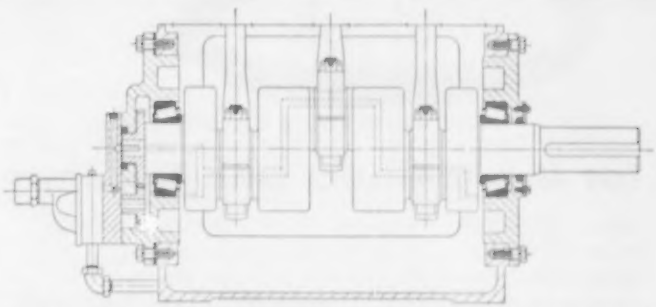
What's more, Timken bearings save power. They practically eliminate friction. Timken bearings are geometrically designed to have true rolling motion, and precision-manufactured to live up to their design. The pump operates smoothly and economically on Timken bearings.

We even make our own fine alloy bearing steel, to be sure it's the finest. We're America's only bearing manufacturer that does.

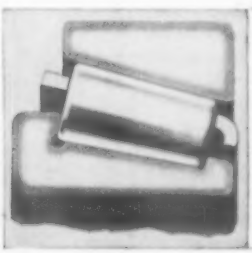
Only Timken bearings give you all these advantages. To get them, always specify Timken bearings on the oil field equipment, or *any* machine, you buy or build. Always look for the trade-mark "Timken" on every bearing. It's your sign of value. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.





HOW WORTHINGTON CORPORATION mounts the crankshaft of its VTE-2 Plunger Pump on Timken bearings to assure dependable performance, reduce wear and maintenance.



HARD ON THE OUTSIDE, TOUGH ON THE INSIDE

Rollers and races of Timken bearings are case-carburized to give a hard, wear-resisting surface over a tough, shock-resisting core. Result: longer bearing life.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. Timken fine alloy steels.

TIMKEN

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER — THE TIMKEN TAPERED ROLLER — BEARING TAKES RADIAL | AND THRUST — LOADS OR ANY COMBINATION ✳

They Say—

Texans Explain Position

Dear Sir:

Our association has been greatly interested in the controversy now existing in Texas in regard to current unrestricted production from water floods. We have followed this matter with great interest since objections were raised to unrestricted water-flood production before the Texas Railroad Commission last fall.

We have not announced any official position of this association to this date in regard to the matter, and our executive committee, on this date, decided that we are not announcing any official stand of the association at this time. Our executive committee further discussed the fact that in an article of The Oil and Gas Journal of December 19, 1955, the article being entitled "Unlimited Water Floods Challenged," by Robert J. Enright, on Page 51, the following appeared:

"The alarm spread quickly and by late November the North Texas Oil and Gas Association and the Permian Basin Water Flood Association had pledged to join the West Central Texas group to thwart any changes in water flood regulating policies such as urged by Humble . . ."

Our executive committee instructed me to write your magazine and advise that this statment was not authorized by our association, and that we have not pledged to join the West Central Texas group to thwart any changes in water flood regulating policies.

Our position at this time is that we will continue to study this matter in an effort to discover the true facts in regard to the controversy, and we will announce our official stand when we have concluded our study. We ask that you retract the above quoted statement.

George W. Anderson, Jr.
Executive Vice President
North Texas Oil and Gas Assn.

Editor's note: Reader Anderson is correct. This letter is the first official statement of the association's position.

Any Fun in Engineering?

"Few engineering students seem to enjoy what they are doing. They dislike working problems, complain about having to learn the fundamentals of drafting, and fail to see the purpose of most of the work burden placed upon them.

"The essential problem is: Why should engineers be unhappy with their engineering education? Several answers might be proposed:

"**. . . The student is not really secure** in his desire for an engineering education. He might be studying engineering because of external pressures rather than a genuine desire—external factors such as the vigorous advertising of the need for engineers."

"**. . . The student feels the curriculum is uninteresting** . . . . The student is troubled by the necessity of mastering the tools and techniques of the scientist before he is capable of handling the more interesting (for him) engineering problems."

"**. . . The student feels that engineering is a means** rather than an end in itself—for example engineering as a lever into management.

"The over-all picture, however, is not as bleak as has been presented above. Probably the engineering student is no more dissatisfied or uncertain than other professional students.

"If the student could somehow be exposed at the freshman or sophomore level to the various engineering fields and problems with which he will ultimately be concerned, a valuable service would have been rendered. Perhaps this could be partially accomplished by adding an information course in gen-

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Southwestern Plastic Pipe is light weight, easy-to-transport, easy-to-handle, easy-to-install. Fewer men and less time are required for installation. With rust, rot and electrolytic corrosion eliminated, maintenance problems are reduced to a minimum.

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eral engineering on the underclass level."

Editorial in "The Rice Engineer," student engineering publication at Rice Institute, Houston.

Machines Need Men

"No invention has ever long retarded the pace of employment—although some have required periods of adjustment.

"The worker, with better tools, has produced more—so has earned more, and with less effort. In 1860, about 36 per cent of the national income went to labor. Succeeding decades saw some notable labor-saving devices invented. . . . By 1880 labor was receiving more than half the national income.

"Today, with machines multiplying production everywhere, the biggest labor force in our history is getting 70 per cent of the world's greatest national income.

"All this comes to mind because of the development of 'automation' and some expressed fears that machines with brains may cause unemployment. Actually, there is no such thing as a machine with brains. All machines require human intelligence to create, operate, and maintain. We will need higher skills—but with the aid of his robot servants, each worker will produce more, earn more, and spend more."

W. Alton Jones, chairman of the board, Cities Service Co., in editorial in Service, company publication.

Engineer Series Praised

Dear Sir:

You are doing a good job in your series of articles on "the shortage of technical graduates." Thought you might be interested in a copy of my letter to Mr. Mitchell *(A. H. Mitchell, Carter Oil Co., see The Oil and Gas Journal, January 23, page 44).*

Alf M. Landon
Topeka, Kans.

Canada's True Stature

"In an economic study of Canada, it was pointed out that in terms of the world's production, Canada ranks six times greater than her population. In other words, we're not a nation of 16 millions, we're a nation of 100 millions.

"That may be the sort of arithmetic which appeals more to philosophers than to mathematicians, but it's none the less worth remembering. For when you start thinking of Canada as a nation of 100 millions you begin to realize the weight we carry in the world's markets—and the world's politics. In a very real sense, we are one of the world's Great Powers."

J. R. White, president, Imperial Oil, Ltd., in address before Halifax Board of Trade, Halifax, N. S.

A Treadmill

"It always takes another oil field, and another and another—just to stay even."

C. H. Wright, chairman of the board, Sunray Mid-Continent Oil Co., in interview published in Sunray News.

ALL ABOARD with Chromium Chemicals

Probably very few of the Aerotrain's 400 passengers know the extent to which Chromium Chemicals are riding with them. Of course, the gleaming chromium plated fixtures throughout the train are easily recognized, but not many passengers are aware that the engine's cylinder liners and bearing surfaces are hard chrome plated to reduce wear, or that Chromium Chemicals also play an important role in inhibiting corrosion in the engine's cooling system.

This new light-weight passenger train is another illustration of the way in which modern transportation takes advantage of the versatile properties of Chromium Chemicals to beautify, protect and preserve metal against wear and the elements.

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CALENDAR

MARCH

6-7	Annual gas processing conference, University of Oklahoma, Norman, Okla.
7-9	American Petroleum Institute, Division of Production, Southern District meeting, Plaza Hotel, San Antonio, Tex.
7-9	Society of Exploration Geophysicists, 9th annual midwestern meeting, Texas Hotel, Fort Worth.
12-16	National Association of Corrosion Engineers, annual convention, Statler Hotel, New York City.
19-21	Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.
11-23	American Petroleum Institute, Division of Production, Southwestern District meeting, Texas Hotel, Fort Worth.

24 North Texas Oil and Gas Association, annual meeting, Wichita Falls, Tex.

29-30 American Institute of Mining, Metallurgical, and Petroleum Engineers, Dallas section, conference on economics and valuation, Statler-Hilton Hotel, Dallas.

APRIL

2-3 Petroleum Engineering Conference on electrical and radioactivity logging, University of Kansas, Lawrence, Kans.

3-5 Annual Corrosion Control short course, University of Oklahoma Extension Study Center, Norman, Okla.

4-6 American Gas Association, general management conference, Conrad Hilton Hotel, Chicago.

4-6 American Petroleum Institute, Division of Production, Mid-Continent District meeting, Broadview Hotel, Wichita, Kans.

4-6 Society of Lubrication Engineers, eleventh annual meeting and exhibit, Wm. Penn Hotel, Pittsburgh.

8-13 American Chemical Society, general meeting, Dallas.

9-10 Texas Petroleum Research Committee, Ninth Oil Recovery Conference (Symposium on Natural Gas in Texas), Texas A. & M. College, College Station, Tex.

11-13 Natural Gasoline Association of America, Texas Hotel, Fort Worth.

14-15 Southern Gas Association, conference on use of electronic computers by engineering personnel, Hilton Hotel, El Paso.

14-18 Petroleum Equipment Suppliers Association, annual meeting, Boca Raton Hotel & Club, Boca Raton, Fla.

15-17 Texas Independent Producers and Royalty Owners Association, Statler Hilton Hotel, Dallas.

16-18 American Society of Mechanical Engineers, first Gas Turbine Power Conference, Hotel Statler, New York.

17 American Institute of Chemical Engineers, Philadelphia-Wilmington section —University of Pennsylvania, fourth annual meeting of "Experience in Industry" series.

17-19 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

18-20 American Petroleum Institute, Division of Production, Rocky Mountain District meeting, Cosmopolitan Hotel, Denver.

18-20 National Petroleum Association, semiannual meeting, Cleveland Hotel, Cleveland, Ohio.

19-20 Third Annual West Texas Oil Lifting Short Course, Texas Technological College, Lubbock, Tex.

19-21 Gas Appliances Manufacturers Association, annual meeting, The Greenbriar Hotel, White Sulphur Springs, W. Va.

23-25 Southern Gas Association convention, Dallas.

23-26 American Association of Petroleum Geologists and Society of Economic Paleontologists, annual meeting, Conrad Hilton Hotel, Chicago.

24-25 Pacific Coast Gas Association, Supply and transmission conference, Thunderbird Hotel, Las Vegas, Nev.

25-27 American Petroleum Institute, Division of Production, Eastern District meeting, Deshler-Hilton Hotel, Columbus, Ohio.

25-29 World Oil Exposition, Houston.

30

May 1 Independent Petroleum Association of America, semiannual meeting, Statler Hotel, Los Angeles.

30

May 4 American Petroleum Institute, Safety

IT'S GOTTEN TO BE A HABIT . . .

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A versatile body for gin pole winching, and all types of flatbed work. The Leland Packaged Unit is internationally known for flexibility and safety in operation plus outstanding long life.

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Leland pole trailers are available in both single and tandem axle and may be equipped with any of the standard brakes. Rugged construction linked with simple design has made these trailers extremely popular.

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One man, unassisted, can load the Leland single axle self-loading float. Heavy duty suspension unit is provided for safety to the float and to the pay load. Dual disc or demountable rim type wheels at your option.

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For the really heavy loads many contractors have specified Leland tandem self-loading float with rugged tubular-type axles and die-formed pressed channel steel frame. Standard beam center runners add great strength and 2 inch center-matched hardwood deck provides for easy sliding and long life.

Also available from Leland — the well-known fifth wheel body for trailer, gin pole, or flatbed work. Service bodies . . . dump bodies . . . platform bodies . . . low bed trailers . . . Tulsa winches . . . and a complete line of miscellaneous equipment.

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and Fire Prevention midyear meeting, Warwick Hotel, Philadelphia.

30-May 5 International Course on Atomic Energy, sponsored by National Industrial Conference Board, Westchester Country Club, New York.

MAY

1-3 Petroleum Industry Electrical Association, annual meeting, Statler-Hilton Hotel, Dallas.

6-9 American Institute of Chemical Engineers, Roosevelt Hotel, New Orleans.

7-8 Gas Compressors Institute session, sponsored by University of Kansas and Southwest Kansas petroleum industry, Liberal, Kans.

7-11 American Welding Society, annual spring meeting, Hotel Statler, Buffalo.

9-10 Symposium on control of corrosion in the chemical industry, University of Buffalo.

9-10 National Association of Corrosion Engineers, Niagara frontier section, symposium on control of corrosion in the chemical industry, University of Buffalo.

10-11 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Statler Hotel, Los Angeles.

10-11 American Gas Association, Gas Supply, Transmission, and Storage Conference, Conrad Hilton Hotel, Chicago.

13-16 American Petroleum Institute, annual pipeline conference, Shamrock Hilton Hotel, Houston.

14-15 American Institute of Mining, Metallurgical & Petroleum Engineers, Kansas regional meeting, Broadview Hotel, Wichita.

14-16 Petroleum Electric Power Association, eighth annual convention, Robert Driscoll Hotel, Corpus Christi.

14-17 American Petroleum Institute, Division of Refining, midyear meeting, Montreal.

16-18 American Gas Association, Chemical, Engineering, and Manufactured Gas Production Conference, Benjamin Franklin Hotel, Philadelphia.

17-18 Rocky Mountain Petroleum Sections, joint meeting, Gladstone Hotel, Casper, Wyo.

22-24 Pennsylvania Gas Association, Pocono Manor Inn, Pocono Manor, Pa.

24-25 Natural Gas and Petroleum Association of Canada, Sheraton Brock Hotel, Niagara Falls, Ont.

24-25 Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington, Ky.

24-25 Western Petroleum Refiners Association, Michigan Regional Meeting, (location to be announced).

28-30 Chemical Institute of Canada, 39th annual conference and exhibition, Sheraton-Mount Royal Hotel, Montreal.

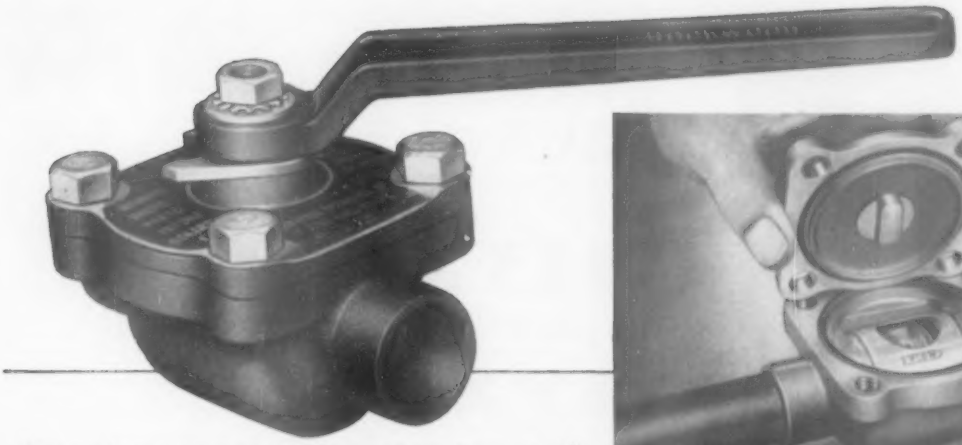
30-June 1 Texas College of Arts & Industries, eleventh annual short course in Gas Technology, Kingsville, Tex.

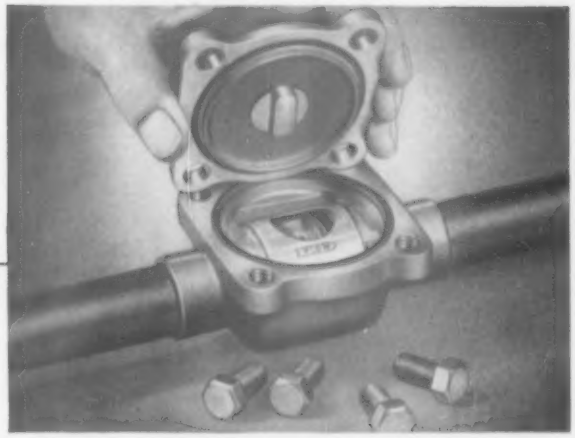
30-June 2 Interstate Oil Compact Commission, Dallas.

JUNE

6-8 American Society for Quality Control, tenth annual convention, Palais du Commerce, Montreal.

11-15 American Institute for the Advancement of Science, Gordon Research on Conference on Catalysis and Petroleum, Colby Junior College, New London, N. H.





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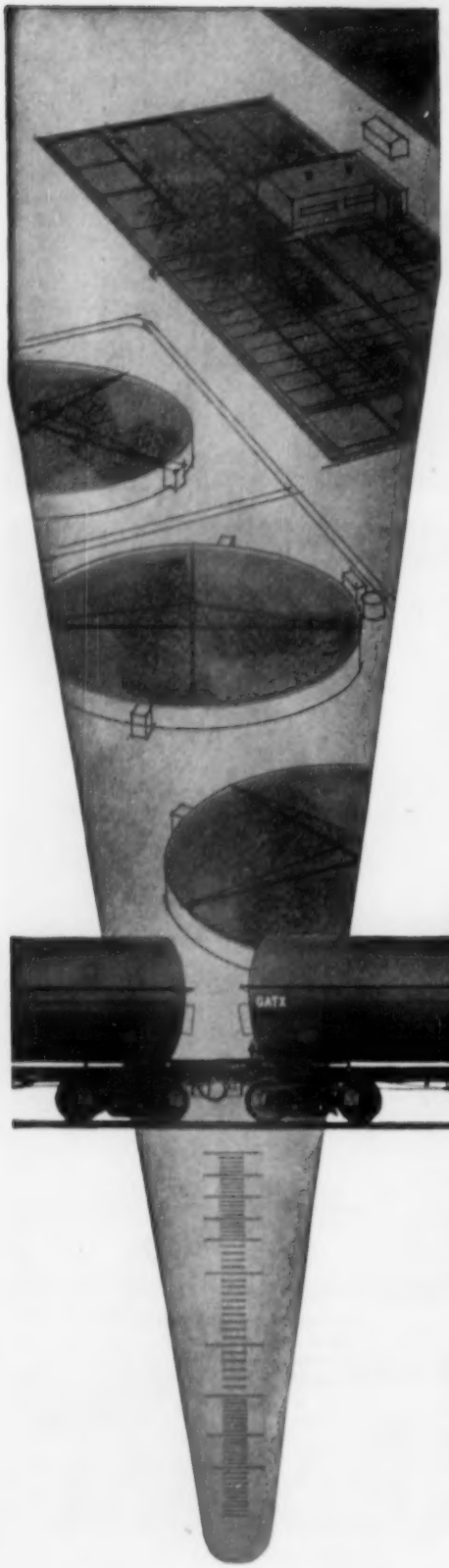

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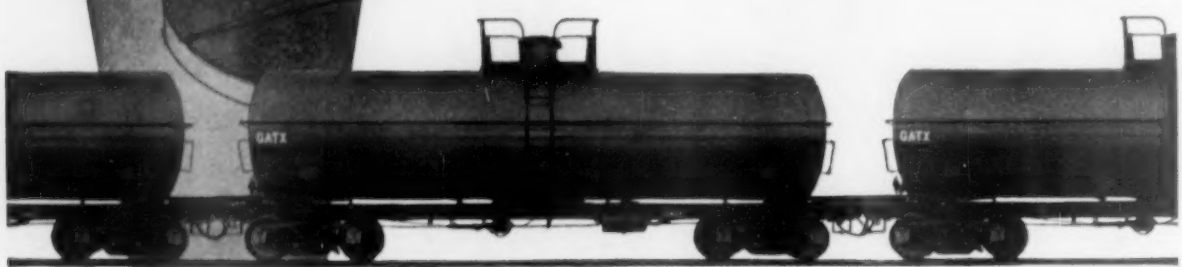

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TULSA, OKLAHOMA

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JOURNALLY SPEAKING . . .

Bread and Water

IT is no time for mirth and laughter in the cold gray dawn of the morning after the veto of the gas bill. There's nothing humorous about it.

We did, however, get a glimmer of bitter irony when we happened to glance at the headline on the cover of the Journal's February 13 issue. "Gas Again a Free Enterprise," it said, announcing a story on Senate passage of the Harris-Fulbright bill. What a premature jump to a false conclusion! How wrong can you get?

That headline was written, of course, when everybody assumed that a President who had been elected on a platform of free enterprise would go along with a majority of Congress on a bill to restore free enterprise to an industry that had functioned so well and so long under it. It was written a week before the veto message which so forcefully brought home to us that the White House is occupied by a professional soldier accustomed to a military code of justice which considers it due process of law to confine an entire regiment to barracks on bread and water because one private had his shirt unbuttoned.

In this case the regiment confined to barracks is a regiment of gas producers, drillers, and explorers. They were mustered and ready to march onto the field and do battle against the threat of a gas shortage. Now they will stay in their barracks or turn their attention to oil production which (keep your fingers crossed) is still a free enterprise. They don't function well on bread and water, which is the diet the Federal Power Commission will prescribe for them if it follows the urgings of consumer spokesmen.

There may never be a complete tabulation of all the projects to drill more gas wells and build more pipelines that were put on the shelf following the veto. But we are confident that they are many, and that in a year or two their shelving will have a serious effect in the inability of many areas to obtain more gas. There is a bit of grim irony in this prospect, but we're not sure whom the joke is on.

The only person we know of who saw anything funny about the whole incident was Senator Wiley of Wisconsin. He danced a jig for the news photographers to demonstrate his elation over the veto. Senator Wiley's constituents, or the small percentage of them who have natural gas, pay household rates that are about as high as any in the nation for gas that has a field price lower than the national average.

Only one pipeline takes gas to Wisconsin. So Senator Wiley reasons that the high price of gas in his state just naturally must be due to exorbitant prices charged by producers. Therefore he favored penalizing producers and making it unattractive for them to develop more gas and sell it to his state. Had the bill become law, it might have stimulated a big competitive contest to see who could sell the most gas in Wisconsin and thus break the monopoly Wiley complains about.

So the senator dances a jig because the producers are condemned to bread and water and Wisconsin is condemned to a limited supply of gas. It's a great joke. Only time will tell who is the butt of it.

A regiment publicly disgraced and court martialed can still do routine drill and menial assignments. But the drilling won't be spirited and the assignments won't be carried out with vigor and verve. Gas will still be produced and some more will be discovered and sold. But with the demand for gas increasing by leaps and bounds, the troops on the front line ought to be fit, nourished, and encouraged.

Soldiers on short rations usually manage to scrounge extra morsels some way or other. Gas producers will look for such morsels in local markets, intrastate sales not subject to federal price control. This will keep a lot of them going, and many of them may make out so well that they will never return to the regulated federal chow line.

And as for the private whose unbuttoned shirt brought this dire punishment to the whole regiment, the industry ought to button him up but good and keep him that way.

—*Henry D. Ralph.*

For Permanent-Type Well Completions

THE BAKER

RETAINER PRODUCTION PACKER

PRODUCT NO. 415D

BAKER PACKERS ADD PERMANENCE TO PERMANENT-TYPE WELL COMPLETIONS

When you select a Packer for a Permanent-Type Well Completion, remember this fact: of all the tools used in permanent-type well completions, only the *Packer* is required to be *permanent*. Guns, Extensions, Plugs, Gas-Lift and Circulating Valves can be removed or replaced on wire line . . . but the Packer, like the casing, is required to perform for the life of the selected producing intervals. Baker Packer Completions are Permanent Completions from the standpoint of packer performance.

Advantages of Baker Retainer Production Packer in Permanent-Type Well Completions:

PERMANENT, RELIABLE PACK-OFF will hold against any pressure differential from above or below that is safe for the casing.

FREE TUBING STRING . . . neither set-down tubing weight nor tubing tension required to achieve and maintain pack-off. Tubing can be anchored to Packer if desired.

CAN BE USED AS A SQUEEZE OR A PRODUCTION TOOL.

MEETS PERMANENT-TYPE WELL COMPLETION DIMENSIONAL REQUIREMENTS.

CAN BE SET ON WIRE LINE. PERMITS EASY REMOVAL OF TUBING STRING.

READILY DRILLABLE IN CASE OF EMERGENCY OR NEED.

BAKER OIL TOOLS, INC. HOUSTON • LOS ANGELES • NEW YORK

Will Ike again mean gas again?

NOW that President Eisenhower has announced his intention to run for a second term, the oil and gas industry can make certain assumptions and lay definite plans regarding new legislation on natural gas.

The most favorable assumption is that Ike will be reelected—favorable because he is the only major candidate who has endorsed even the principle of the dead Harris-Fulbright bill. The assumption that congressional leadership will remain in the hands of Democrats from the Southwest is also favorable.

But it should not be assumed that Eisenhower will sponsor and push a gas bill next year even though he had kind words for it in his veto message. There are too many political pressures on the other side to warrant an assumption of more than sympathetic neutrality. Nor should it be assumed that the industry's congressional friends will run through the same kind of political gauntlet a second time.

THE ONLY SAFE ASSUMPTION is that producers must win friends and influence people for a new gas bill by their own efforts, and that they must do it more effectively during the coming year than they have done in the past.

New attitudes and new approaches must be adopted. The former tactics of righting the wrong of an unjust court decision and attacking opponents as misguided, selfish, or malicious must be modified. Producers need a lot more friends outside the White House and Congress than they have now or are likely to have next year, and friends must be won by wooing, not bludgeoning.

Gas distributors must be won over to a realization that the present law is bad for them, too, and then producers and distributors must suppress their antagonisms and sit down to work out a mutually acceptable plan.

Consumers' hysterical fears of runaway gas prices must be calmed by drafting new legislative wording that will meet the requirement of the veto message for "specific language protecting consumers in their right to fair prices."

The industry's "bad press" in the East can be overcome to a considerable extent by erasing the ill will of the newspapers' readers plus a continued campaign of information and education.

THERE'S GREAT HOPE in the fact that the front-running presidential candidate is not only against federal control of business in principle but has specifically endorsed the need for gas legislation. This will strengthen the spirits of the industry's congressional supporters.

But we can't rely on that alone. Many more people in many other places must be persuaded to support a new bill. That's the industry's big job during the coming months.

Save up to 25% on cementing costs with

DIACEL* CEMENT SYSTEMS

Low water loss! Low density! Low costs!

With low water loss DIACEL cement systems you get better fill-up and reduce damage to pay zone formations caused by water from the slurry. DIACEL cements also help prevent pipe sticking and "flash setting." And you can control thickening time with DIACEL LWL using ordinary portland cement.

With low density, low water loss DIACEL cements you can rotate and reciprocate the casing to minimize channeling. You encourage a better bond between pipe and hole. Versatile DIACEL systems can be formulated with cement densities ranging from 10.5 to 17 pounds per gallon to suit requirements of wells of all depths and temperatures.

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Current and significant in . . .

The Industry This Week

Refining

• **A new cat reforming process** has been developed by Esso Research & Engineering. It's called Powerforming. Three prototype units, first called fixed-bed Hydroformers, are now operating. P. 62.

Sun's revolutionary marketing gimmick—offering five grades of gasoline by blending at the pump—attracted high interest in its first week. Best customers were competitors who took samples for testing. P. 60.

Production

• **A deep strike** by General Petroleum is giving the 37-year-old Santa Fe Springs field at Los Angeles its third big boom. Well came in for 1,776 bbl. daily from a new pay between 8,050-9,010 ft., deepest of the nine oil zones in the field. P. 66.

Free-world production hit an all-time high in December of 14,375,300 bbl. daily. Main factor was a record 7,155,000 bbl. daily output in the U. S. P. 79.

Pipelines

• **Future pipelining** will emphasize technological improvements to make the big transmission lines pay off. The booming construction era has hit a plateau. It may slow down in the next 5 years. That's the concensus of top pipeline men interviewed by The Oil and Gas Journal. P. 70.

First big L.P.G. pipeline in Canada is being planned. Canadian Hydrocarbons, Ltd., of Winnipeg is seeking government approval of the 800-mile carrier. It would run from near Edmonton to Winnipeg. P. 61.

Import tax of 10 cents per 1,000 cu. ft. on natural gas moving into the U. S. from Canada and Mexico is proposed in Congress. P. 63.

Natural Gas

• **Eisenhower's decision to run** is considered a boon to gas producers. Although he vetoed the Harris bill, he's still counted as favoring such a law. A northern Democrat in the White House, most figure, would kill any chance of decontrol. P. 58.

California is stepping up its gas imports from the Southwest. El Paso Natural has just completed contracts to serve three utilities with more than 2 billion cubic feet daily. P. 68.

Exploration

• **John W. Mecom has moved into Honduras.** He and another Houston operator, Ernest Cockrell, Jr., have acquired a concession on 50 million acres on the country's northern coast and plan to bring in equipment for deep drilling. Mecom already has a $20-million exploration deal signed in Colombia and holds half interest in a concession in Haiti. P. 80.

Wildcatters are taking a new look at the Puckett gas field in Pecos County, far West Texas. Gulf Oil has a promising oil well just outside the field, 30 miles south of nearest oil production. P. 76.

Petrochemicals

• **Two giant petrochem plants** will rise in Texas this spring: Firestone's butadiene plant at Orange and a butadiene and synthetic-rubber complex planned at Odessa by four companies. Firestone plans further invasion of petrochemicals. P. 72.

The old Carthage Hydrocol plant will be started up in April by Hidalgo Chemical (Stanolind). Hidalgo hopes all bugs have been eliminated in 18 months of rehabilitation. P. 67.

Ike's "Yes" Brightens Gas Bill Hopes

WASHINGTON.—Industry hopes for legislation freeing independent gas producers from federal regulation are soaring.

President Eisenhower's announcement that he is willing to run for reelection dispelled much of the gloom created by his veto of the Harris bill February 17.

Industry leaders quickly pointed out that a second term for Eisenhower would insure White House support for gas legislation. That is implicit, they say, in the statement in his veto message that producer exemption is needed to assure adequate future supplies of gas.

The Political Outlook

A Democratic president, who would come from the north where opposition to gas legislation is widespread, would not be likely to support a reversal of the Supreme Court decision in the Phillips case, they believe.

Observers were more cautious, however, in predicting the timing of a new effort to put the bill through Congress. It is expected that at least a tentative probing of congressional sentiment will be made next year. But the big push can come only when public concern over consumer rates has been allayed and the gas industry can present a united front, they feel.

In announcing his availability, the President admitted he had no idea whether his veto of the Harris bill would hurt him with the oil industry. He repeated his reasons for the veto, which had no relation to the merits of the bill. A number of important oil men wrote or wired the White House on the matter, several saying they saw no other course the President could have followed.

The possibility that in the event of Eisenhower's reelection we may again have a Republican administration and a Democratic Congress is not seen as affecting the chances for legislation.

The lineup on the Harris bill was geographic rather than political. And the drive for it was spearheaded by Democratic leaders without whose support it would have failed.

The immediate reaction in the industry was belief that the Republican convention will renominate Eisenhower next August on his own terms. Political observers generally agree that if he runs he has a good chance of winning.

Even with this assumption, however, the industry has a long row to hoe. A sympathetic attitude in the White House is considered essential. But it guarantees no action and leaves the burden of decontrol still upon the oil industry.

Industry's Job

Under even the most favorable political conditions, however, there are problems in the way of new gas legislation.

Leaders in the industry privately declare that two developments must come about if Congress ever again is to seriously consider it:

The three divisions of the natural gas industry must compromise their differences and present a "solid front" supporting a bill, backed if possible by the state regulatory bodies.

The FPC must deal carefully with the basic problems of producer regulation to avoid decisions which might destroy the chances of legislation.

To accomplish the first of these requirements, one pipeline executive said, the industry must agree on a new concept by which the producer is directly linked to the consumer.

. . . **Producers must realize,** he said, that they are part of the interstate movement of gas. They are the base on which billions of dollars have been invested in pipeline and distribution facilities.

. . . **Pipelines must realize** their dependence upon the producer for the adequate supply of gas to satisfy the needs of distributors and consumers.

. . . **Distributors must recognize** that, through the pipelines, they are equally dependent upon the producers to carry out their obligation to provide service to the 27,500,000 consumers linked to their pipes.

What kind and when? . . . Nobody in the industry is talking seriously of another attempt to get legislation this year. Many company heads are doubtful that it will be possible even next year—or until the public resentment generated by bad publicity dies down.

At the moment, nobody in the industry knows what kind of a bill will be written in the next attempt. But there is considerable thinking that it will not be along the lines of the Harris-Fulbright bill.

As the industry mulls over the problem, however, the spotlight will switch to the FPC offices where many precedent-making decisions must be made over the next few months.

Some of these decisions could so set the pattern of regulation as to endanger the chances of any bill getting through Congress, some in the industry believe. But they believe also that such decisions, if rendered, will be tied up in the courts for a year or more, giving time in which to come in with a new bill before they are finally settled.

FPC Has No Answer

Meanwhile, the Federal Power Commission faces the imminent necessity of fixing independent gas producers' rates with no formula prepared.

How the commission will deal with the problem of setting rates for producers was the major subject of closed-door testimony before a House appropriations subcommittee. The testimony was just released last week.

"I don't think anybody knows," Chairman Jerome K. Kuykendall said frankly. "I do not think members of the commission or the staff know exactly how we are going to do it."

The FPC will come to grips with the problem by midyear. Then the first of a dozen or more producer rate cases already heard by examiners will come up for action and decisions must be made.

The FPC already has found that producer regulation is far more complex than pipeline rate-fixing.

"We have some very difficult problems and we confess that we cannot give you off-the-cuff answers," Kuykendall told the subcommittee.

Kuykendall, with Commissioners Seaborn L. Digby, Frederick Stueck, and William Connole, together with Willard Gatchell, general counsel, were questioned by the subcommittee only 3 days after President Eisenhower's veto of the Harris bill. The fifth commissioner, Claude L. Draper, could not appear because of illness.

No quick decisions . . . Kuykendall made it clear the FPC would move slowly toward putting producers on an original-cost basis.

"The time is not ripe to do it because in the first place we do not have the personnel, and I do not know when we will, to give them the assistance and guidance they would need" Kuykendall explained.

Original cost depreciated may be applicable to producers as a matter of law, he added, "but I for one—and I am sure at least a majority of the commission—are very dubious about the results we will get from using that method."

Commissioner Seaborn L. Digby told the subcommittee why it is not as simple to apply investment cost to producers as to pipelines:

"What cost are you going to base it on? Are you going to base it on the one well the man is selling from to Tennessee Gas Transmission Co.? Are you going to base the cost on the reservoir, all his expenditures in the particular reservoir or field, or interstate or nation-wide or internationally?

"A lot of producers operate internationally. If you are going to set up a cost rate base you first have to determine what cost you are going to consider in calculating that rate base.

"Take a field producing under unit programs," Digby continued. "It may have four, five or six or eight companies owning leases in that one unit. Of these five or six different companies who own leases in that one unit, each one of them would have a different cost rate base and there you might have five or six different rates for the gas coming out of one well."

Some increases due . . . FPC studies revealed that some of the biggest producers are selling gas below a reasonable return on a cost rate, Digby declared.

If the producers in the Appalachian area were put on a cost rate base they could not sell their gas for less than 25 to 30 cents, because those are old fields and there is peripheral drilling that is very expensive for the amount of gas recovered.

The same situation will overtake the Southwest producing areas at some future date, he warned.

Digby told the subcommittee he doesn't know what would be a reasonable return for a producer.

But, he said, "I cannot conceive of an independent producer who uses his risk capital to go out and explore for gas being placed on a reasonable return, whether it be 9 per cent or 6 or 16, because it just would not operate as a practical proposition."

Control Problems

If Congress expects the FPC to regulate all the independent producers on a cost rate base, strictly, the $2,397,904 it is asking for gas regulation and surveys for the fiscal year beginning July 1 "would not be a pittance," Digby commented.

And it should be borne in mind, he said, that while the pipeline company is protected as a utility in return for regulation, there is no benefit the FPC can give to an independent producer in return for regulating him.

Adopted as a fixed policy, original cost could lead to many pitfalls, Kuykendall pointed out. Citing the case of a man on whose farm gas or oil was found and who gets a royalty from it, if he should take his gas in kind and sell it he would have no rate base because he did not put a nickel into his gas investment.

"Would the courts uphold us if we were to say he should get nothing because he has no investment in it?" he asked. "This original cost theory could produce absurd results."

Who is subject . . . The FPC expects to have to regulate only about 2,300 of the more than 8,000 independent producers, FPC witnesses explained.

Producers whose gas is sold through a processing plant managed separately, who receive their proportionate share of the sales price but have no voice in determining it, are not required to file rates or get sales certificates.

The same practice is followed in the case of unitized fields, where the unit operator only is required to file even though there may be 500 small producers in the field.

The general rule is that the operator who is the signatory with the pipeline for the sale of the gas must secure the certificate and file the rate, Digby said.

Kuykendall strongly defended the FPC against charges it has dragged its feet in producer control.

After enactment of the Natural Gas Act in 1938 it was 2 years before the agency decided its first rate case, he pointed out. If it can deal with the first of its pending producer rate cases by midyear it will be moving equally fast while dealing with a much more complicated problem, he said.

Processing BRIEFS

GLENROCK, Wyo. — Continental Oil Co.'s refinery here, closed last month as a noneconomic operation, is being maintained on a standby basis until January 1, 1957.

Conoco said negotiations are under way for sale of the 4,500-bbl.-daily refinery, and that putting it on a standby basis will enable the buyer to return to full operation within 48 hours. A dozen workers are being kept at the plant.

The prospective buyer has not been identified. J. W. Liddell, vice president and regional manager, has said only that the prospect has a specialized market out of state for oil products made at the refinery.

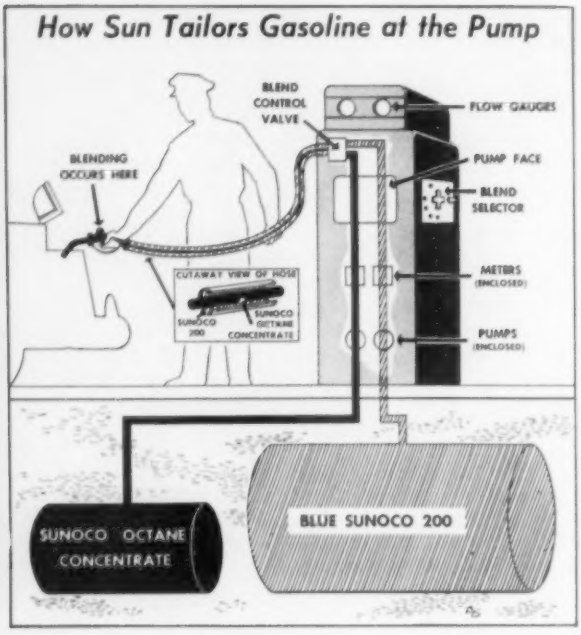
TULSA.—DX Sunray Oil Co. has received bids from buyers for its closed 12,000-bbl. refinery at Allen, Okla., but has not yet acted on any of them. The plant has been closed since November 1953. G. E. Wynn, vice president for manufacturing, said it probably will be sold and dismantled.

BARTLESVILLE, Okla.—Phillips Chemical Co., subsidiary of Phillips Petroleum Co., plans to build a carbon-black plant with capacity of 64,000,000 lb. per year in the Gulf Coast area. The petroleum-based black is used in the manufacture of tires to increase their durability. Phillips has the world's largest carbon-black facilities at Borger, Tex., with capacity of 290,000,000 lb. per year.

NEW YORK. — Esso Standard Oil Co. will build an ethylene plant at its Bayway Refinery at Linden, N. J., to supplement ethylene to be recovered in special facilities announced recently. Major buyer of the product is understood to be Hercules Powder Co., which is planning a polyethylene facility nearby.

TEXAS CITY, Tex.—American Oil Co. officially opened its first Texas service station here recently. Fifteen more are slated for operation by midsummer within a 25-mile radius of Amoco's major refinery.

NEW YORK.—Sinclair Refining Co. is reducing daily average crude runs by 35,000 bbl. for March, April, and May. This amount to an 8 per cent cut from January and February averages. This is the third year Sinclair has reduced runs at the end of the heating-oil season. This is in line with the company's long-range planning for reducing operations when fuel markets are seasonally curtailed.



Sun's 5-in-1-Pump Intrigues Rivals

ORLANDO, Fla.—Some strange customers showed up last week at 17 service stations in the Orlando area participating in Sun Oil Co.'s experiment with a revolutionary new method of selling gasoline.

The stations are selling five grades of Sunoco gasoline from the same pump. The different octane mixtures are blended in the nozzle of the hose just before entering the auto fuel tank *(The Oil and Gas Journal, February 27, page 82)*.

Sun officials report among their first customers were representatives of other oil companies. They took away samples for testing.

Quipped one Sun observer: "It's too early to tell the public interest. But our competitors surely are interested."

Motorist key man . . . Sun hopes it sees a straw in the wind in the test.

Officials say customer loyalty is evident because many motorists are accepting the novel idea with no prior buildup on it. The company has not yet launched an advertising campaign. The idea was sprung on the customers without previous notice.

Actually, installation of all 17 pumps was not completed until late last week here, at nearby Sanford and Winter Park. Thus there has been no good test of the marketing plan. Research experts in the company are closely watching the public reaction. They will study and evaluate the results before Sun decides to expand the project.

Industry interested . . . Sun experts aren't the only technical men looking over the project. Other companies in the industry are keeping a wary eye on Sun.

At least one major company official reports he has instructed company engineers to go to work studying design and mechanics of Sun's novel pump. Processing men are assigned to take apart the gasoline.

The pump and octane concentrate are the key to the system. Two separate underground storage tanks are installed at the service station. One holds Blue Sunoco, the firm's 94-octane, regular-grade gasoline. The other contains the octane concentrate, specially made by Sun refiners.

A dial on the pump is marked for the five grades, ranging from 94 to 100-octane-plus. The dial sets the proportion to be withdrawn from each tank. The pump draws in precise proportions from contents of the two tanks. The fluids flow through separate hoses, one within the other, to the nozzle. There they are blended.

Sun in the past has marketed only one grade of gasoline. It is now offering experimentally five grades blanking the octane gamut. The reasoning is that this will blend the gasoline more nearly to the exact requirements of different auto engines.

Sun officials insist they have not been set long enough to test results. They don't even know yet which of the five grades may prove most popular. But all report the station operators are welcoming the idea and customers appear to be accepting it.

New Diesel Lube Effective

NEW YORK.—A new type of lubricant for diesel engine cylinders—the first of its kind—has proved effective in reducing cylinder wear in large marine engines burning fuel oil.

Developed by Shell in Holland and patented in most countries, the new lube is a stable water-in-oil emulsion. The water carries special additives to combat acidity of heavy fuels. Shell says field trials of the new lube over the past 2 years have proved it reduces wear by as much as 70 per cent. The company says cylinder liners in engines burning boiler fuel will last three times as long using the new lubricant as they will with conventional oils.

Shell began work on the new lubricant when it found that heavy duty oils containing alkaline additives to combat combustion acids proved effective in small diesel engines but not in large two-stroke engines.

Great Lakes Line Boosts Octane

Products carrier jumps premium gasoline to 96, keeping regular at 86; Indiana Standard to meet competition

KANSAS CITY.—Octanes again have started climbing in the midwestern gasoline-marketing area.

Great Lakes Pipe Line Co. starting April 2 will begin transporting a 96-octane, premium-grade gasoline. It will replace the 94-octane grade now moving through the system.

The big products pipeline moves refined products from plants in Oklahoma and Kansas to Kansas City. Branches to the north run to North Dakota, Minnesota, and Chicago.

It sometimes takes as long as 2 weeks for gasoline tenders offered at the southern terminals of the line to reach the north. This will mean that the higher-octane gasoline actually will become available to distributors in mid-April.

What about regular? . . . One surprise of the Great Lakes' action was the announcement that other gasoline grades will remain unchanged.

This leaves regular gasoline tendered on the line at 86 octane. Reports preceding the announced increase said that both premium and regular grades would be boosted 2 octane numbers.

Great Lakes officials gave no explanation for retaining regular at 86. But some observers believe that opposition developed to a double jump. They reason that some refiners would be able to meet the 2-octane jump in premium, but would not have enough catalytic reformate for blending to upgrade both their premium and regular gasolines.

Prices of the higher-octane premium on the Great Lakes line are expected to follow upward too—probably from their present 12½ cents to 13 or 13¼. Prices for regular should remain at the present range of 11-11¼.

Ownership of the Great Lakes line is held by Continental Oil Co., DX Sunray Oil Co., Skelly Oil Co., The Texas Co., Pure Oil Co., Sinclair Oil Co., Phillips Petroleum Co., and Cities Service Oil Co. Other refiners also use the system.

Others involved . . . Meanwhile, officials of the Oklahoma Mississippi River Products Pipeline discounted reports that premium gasoline moved by it would be boosted from 97 to 98 octane. These spokesmen reported they know of no plans for a boost. Octanes on this line normally are higher than those of Great Lakes because it must compete with high-octane products moving up the Mississippi River from the Gulf Coast.

On the other hand, officials of Standard Oil Co. (Indiana) reported they will move gasoline octanes up to equal if not exceed those of their competitors. This upward move is expected about May 1. Indiana Standard markets in the midwestern region and competes in many places with products moved on the Great Lakes system.

L.P.G. Line Asked

Project will be first major one of its type in Canada

OTTAWA.—Canadian Hydrocarbons, Ltd., of Winnipeg is seeking government approval of Canada's first major L.P.G. pipeline.

The proposed line, to be built by Hydrocarbons Pipeline, Ltd., Canadian Hydrocarbons' subsidiary, would extend 800 miles from near Edmonton to Winnipeg. Cost is estimated at $35,000,000, of which $25,000,000 would go to main line, $6,000,000 for a gathering system, and $4,000,000 for storage.

The line would make propane and butane available in the prairie provinces. The proposed route runs through Saskatoon, Sask., Minnedosa and Brandon, Man., to Winnipeg.

R. K. McConnell, Toronto, a director of Canadian Hydrocarbons, says a general engineering survey proves the line would be economically feasible. It must await construction of field processing plants in Alberta when natural-gas export begins. Current L.P.G. production from natural gas is little more than a dribble, something over 20,000 bbl. a month.

The company offers no prospective date for construction to start. No goal is set for beginning operations of the line.

The project has cleared one legislative hurdle. Having been approved by the transport committee of the Canadian Senate, it now goes before the full Senate for consideration. Commons also must authorize the construction.

Wildcat Off Texas Delayed

HOUSTON.—Shell Oil Co. has delayed plans for drilling a wildcat 63 miles off the coast of Texas.

The mobile platform, "Mr. Gus," which was scheduled to drill the test, is now working for Shell a short distance off the coast of Matagorda County. Current location is in State Tract 488 in water about 30 ft. deep. Shell has three gas wells nearby.

A piling on the big mobile platform was damaged when the unit was being towed to location 63 miles off Galveston *(The Oil and Gas Journal, February 13, page 78)*. Temporary repairs were made to permit drilling of one well in shallow water before the unit is overhauled.

Premium Up Again

But house-brand gasoline holds steady in February

NEW YORK.—Premium gasoline octanes edged up 0.2 research octane number in February, while regular grade remained the same as in January.

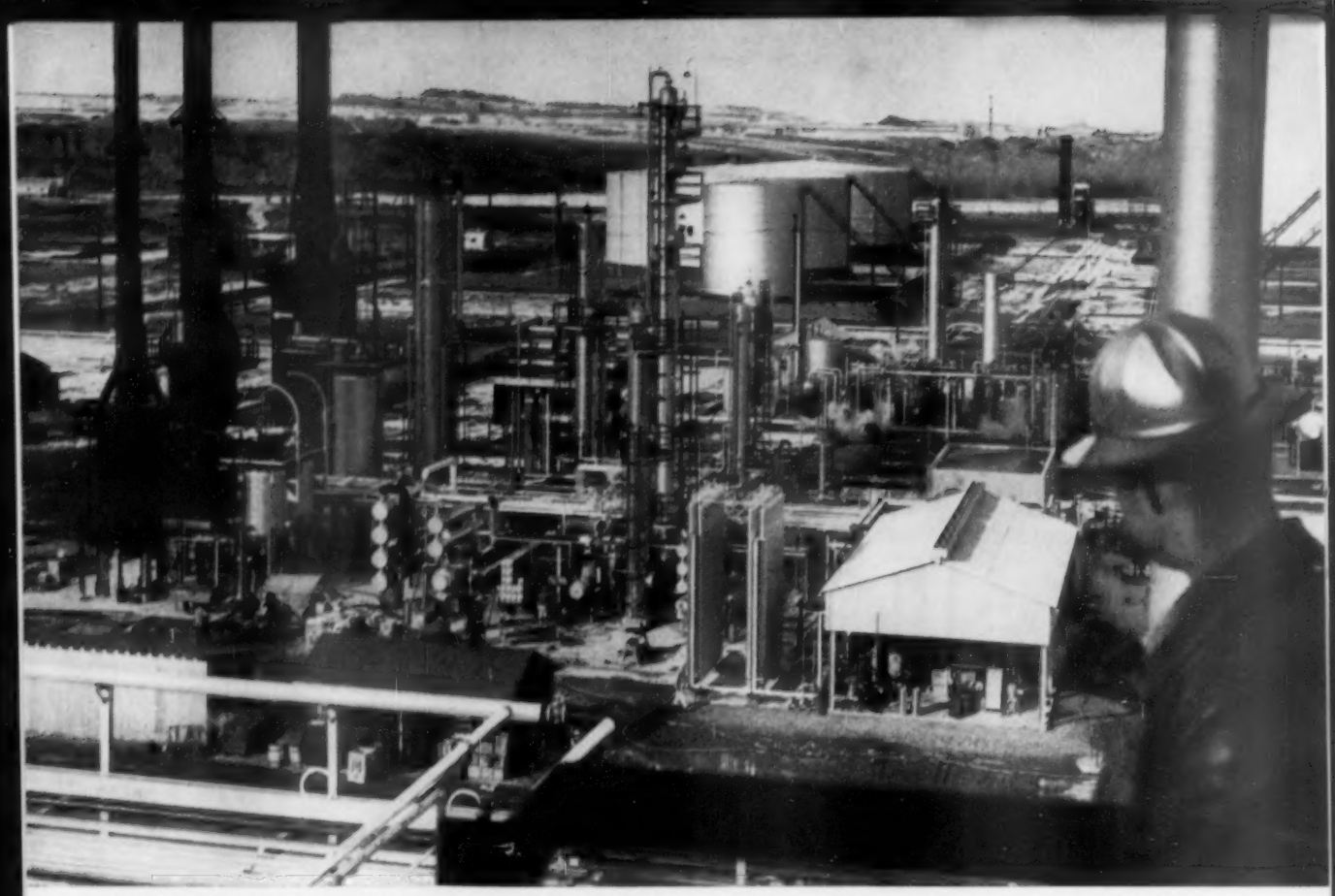
The current monthly survey by Ethyl Corp. shows a weighted average rating of 96.4 for premium grade and 89.2 for house brand.

Of the 53 cities surveyed, 35 showed a monthly gain in octanes for premium. Ten increased ½ octane number. Eight cities declined while 10 were unchanged from January. Premium today stands 1.6 octane numbers higher than a year ago. The distribution by octane number for premium follows.

	Feb. 1956	Jan. 1956	Feb. 1955
90-90.9	0	0	3
91-91.9	0	1	0
92-92.9	2	0	12
93-93.9	3	5	4
94-94.9	7	7	14
95-95.9	13	14	19
96-96.9	12	14	1
97-97.9	16	12	0
Total cities	53	53	53
Wtd. avg. ON	96.4	96.2	94.8
Wtd. avg. TEL ml./gal.	2.47	2.48	2.32

On house brand, 28 cities received increases over January. Decreases were noted in 20 cities while 5 remained the same. In distribution, the 53 cities showed the following breakdown for regular in February:

	Feb. 1956	Jan. 1956	Feb. 1955
82-82.9	1	1	3
83-83.9	0	0	3
84-84.9	1	1	15
85-85.9	5	3	1
86-86.9	13	14	4
87-87.9	2	3	11
88-88.9	6	8	4
89-89.9	10	10	4
90-90.9	6	7	6
91-91.9	9	6	0
Total cities	53	53	53
Wtd. avg. ON	89.2	89.2	87.4
Wtd. avg. TEL ml./gal.	2.19	2.19	1.87



ONE OF THREE POWERFORMERS already operating is unit at left of picture at Carter's Billings refinery. The new 2,500-bbl. cat reformer was just started up along with 6,900-bbl. Hydrofiner, unit in center with tall tower.

New Cat Reforming Process Unveiled

Feed Stock and Operating Results With Powerforming

FEED STOCK INSPECTIONS

	Light Arabian	Heavy Arabian	Mixed La.	Heavy W. Texas
Gravity, °A.P.I.	61.9	54.0	60.3	50.6
*Sulfur, weight per cent	0.03	0.07	0.005	0.20
CFR-R octane, clear	39.0	29.7	53.0	46.1
Distillations, °F.:				
10 per cent	216.0	276	205	288
50 per cent	241.0	326	231	308
90 per cent	282.0	370	293	350

OPERATING RESULTS

	Light Arabian	Heavy Arabian		Mixed La.	Heavy W. Tex.
Research octane, clear	95	95	100	98	98
Research octane, + 3 cc. TEL	100.5	100	103	103	102
Motor octane, clear	85.5	85	88.5	88	87
Motor octane, + 3 cc. TEL	92	91.5	93.5	93	92
Yields:					
C_3+, volume per cent	72.5	77	69	72.5	81
C_4, volume per cent	10.5	9	11.5	10.5	6.5
C_1-C_3, weight per cent	12.5	12	16.5	12	8.5
H_2, weight per cent	1.4	1.0	0.7	1.8	1.8
H_2, s.c.f./bbl.	680	510	350	880	930

*Before Hydrofining.

NEW YORK.—A new catalytic-reforming process called Powerforming has been announced by Esso Research & Engineering Co.

Refining affiliates of Standard Oil Co. (N. J.) have plans in the works to invest $60,000,000 in Powerforming units in refineries here and abroad.

Three prototype units of this process are now in operation at Esso Standard Oil Co.'s Baltimore refinery, at Carter Oil Co.'s Billings, Mont., refinery, and at the Edmonton, Alta., refinery of Imperial Oil, Ltd. Thirteen more are under construction or in the planning or design stages.

Process details . . . The process is a fixed-bed cyclic type employing relatively small amounts of platinum.

New units now in the design and construction stages will use four, five, and six reactors with three, four, or five on stream while one is being regenerated by a special technique.

Reactors will remain on stream during periods varying from 5 to 15 days. The new regeneration technique, Esso

says, permits the catalyst to retain its high initial activity indefinitely.

High feed rates give excellent yields of high-octane product along with high yield of hydrogen. Fluid-coker naphtha can be blended with low-octane virgin naphtha to give excellent results, Esso says. Hydrofining of feed stocks is not necessary but is generally preferred.

Fixed-bed Hydroforming . . . The first Powerforming units which are now in operation have been designated in the past by Esso as fixed-bed Hydroforming.

They will now be known officially by the new name, as will the newer units which incorporate standby reactors for regeneration purposes.

Units existing and planned . . . Capacities of units operating are 2,500 bbl. at Baltimore, 2,000 bbl. at Edmonton, and 2,500 bbl. at Billings. Carter just placed the new unit on stream, along with a 6,900-bbl. daily Hydroformer to increase yields of diesel fuel and reduce their sulfur content.

Imperial is building Powerformers at Ioco, B. C., 3,300 bbl.; Sarnia, Ont., 13,500 bbl.; and Montreal, 9,000 bbl.

A large unit is planned at Esso's Bayway refinery, Linden, N. J.

All units now operating and planned range from 1,000 to 26,000 bbl. per day. Capacity totals over 100,000 bbl. per day. Unit costs will vary with size of the Powerformers. They can be about $200 per barrel of daily feed capacity for basic units only.

International Refineries, Inc., an independent, is building a 2,800-bbl. Powerformer at Wrenshall, Minn.

Wyoming Crude Line Planned

CHEYENNE, Wyo.—Construction will begin in August on a 34-mile, 6-in. crude line from Wyoming's Murphy Dome field to a connection in Big Horn County with lines owned by Ohio Oil Co. and Interstate Pipeline Co. The new line will be completed about December 1.

Owners of the $450,000 line will be Farmers Union Central Exchange, Inc., 50 per cent, and Mule Creek Oil Co. and Shannon Oil Co., each 25 per cent. Farmers Union and Mule Creek are Billings, Mont., firms while Shannon's headquarters is in Denver.

The new line will allow producers to move crude to the Farmers Union refinery at Laurel, Mont., and to Continental Oil Co. and Carter Oil Co. refineries at Billings.

The Wyoming Public Service Commission approved a tariff of 5 cents a barrel for transporting the crude.

U.S. Asked to Tax Gas Imports

WASHINGTON.—An import tax of 10 cents per 1,000 cu. ft. on natural gas moving into the United States from Canada and Mexico has been proposed in Congress.

Rep. Cleveland M. Bailey of West Virginia introduced a bill, which is aimed directly at Canadian gas. Domestic coal producers see this gas as a new competitor.

Bailey pointed out that Canada now taxes gas and coal moving in from the United States, adding: "The Canadians thus cannot seriously object to imposition of an import tax on such natural gas as may be authorized to be brought into the United States."

The Federal Power Commission, Bailey said, is being asked to approve the import of Canadian gas without knowing two things:

. . . Extent Canada will subsidize its proposed pipeline.

. . . Extent United States domestic fuel industries will be asked to compete against a subsidized Canadian industry.

"Such subsidized competition would represent a disruptive and destructive force loosened upon the American fuel industries—natural gas, oil, and bituminous coal," Bailey asserted.

"It is only the exercise of common sense to act now to protect our own best interests in this manner by writing into the law an import excise tax. We are only doing here that which has already been done by the Canada . . ."

Industry BRIEFS

AUSTIN.—Texas' crude-oil production allowable inched up to an all-time high of 3,405,390 bbl. daily for the week ended February 25. The figure was 1,210 bbl. a day higher than the previous record set only a month ago. The allowable is shared by 165,431 wells in 5,250 fields. The number of wells was boosted by 243 completions during the week.

LANSING, Mich.—A proposal by Gov. Mennen Williams to create a state petroleum board to supervise the oil industry has been killed by a state senate affairs committee.

It was proposed following investigation of gasoline prices by state Atty. Gen. Thomas M. Kavanagh. The bill called for a board of five to license refiners and wholesalers and make continuous review of gasoline prices *(The Oil and Gas Journal, February 20, page 97).*

BATON ROUGE.—Louisiana's oil-production allowable for March has been increased to 773,982 bbl. daily. This is 10,882 bbl. over the daily allowable for February. State Conservation Commissioner John B. Hussey said the increased allowable is enough only to allow for new production.

WASHINGTON.—The Federal Power Commission has formally granted approval for expansion projects proposed by United Gas Pipe Line Co. of Shreveport, La., and Southern Natural Gas Co., Birmingham, Ala.

It authorized about 63 miles of pipeline and a new 330-hp. compressor station on United's system in Mississippi, Alabama, and Florida at an estimated cost of $10,055,832. Southern's project includes about 52 miles of pipeline and 4,950 additional horsepower in compressor capacity on its system in Alabama, Georgia, Louisiana, and Mississippi at a cost of $2,361,219.

SAN ANTONIO.—LaGloria Oil & Gas Co. has bought petroleum properties from Ralph E. Fair of San Antonio for approximately $3.5 million. Involved are Fair's interest in 45 oil wells and a gas well on a 1,000-acre lease in LaGloria field of Jim Wells and Brooks counties and Fair's 10 per cent interest in a 3,000-acre unitized block in Columbus field, Colorado County, where there are 19 producers.

CALGARY.—Further extensions of time limits to arrange financing, start construction, and begin moving natural gas from Alberta have been granted Trans-Canada Pipe Lines, Ltd. The Alberta Petroleum and Natural Gas Board announced the deadline for completing financial arrangements was extended 6 months, from April 30 to November 1.

The company was to have started construction on the pipeline by June of this year. That deadline was extended a year to June 30, 1957. The deadline for exporting of gas from Alberta, set for December 31 of this year, also was extended 1 year.

EDMONTON.—Alberta crude pro-duction last year totaled 113,035,046 bbl. and was worth $274,245,900 to producers. At the end of 1955, there were 28,273 active oil and natural-gas leases registered covering 17,557,993 acres. Figures were contained in the provincial budget handed the legislature.

Cars to Require Better Fuels, Lubes

DETROIT. — Nothing has happened in engine design to indicate that the auto industry can go to higher and higher compression ratios and greater horsepower without corresponding increases in octane ratings in motor fuels.

While the refining industry has greatly improved its motor oils and other lubricants, they are in some cases not as good in actual performance as their manufacturers and marketers claim.

Furthermore, changes in engine design, including steering and transmission, have brought new problems in lubrication, some of which have not been satisfactorily solved.

Cooperation between the oil and automotive industries has had many accomplishments to point to through the years. But misunderstandings still arise and there are now new and old problems of mutual importance which require immediate attention.

These situations were revealed at the seventh annual session here February 28 of the lubrication committee of the American Petroleum Institute's marketing division.

What engine trends mean . . . Higher compression ratios in engines will continue to mean higher octane ratings, but other qualities in motor fuels can continue about as they are now, according to J. K. Appeldoorn of the products research division of the Esso Research & Engineering Co. He discussed research work by his company on this general subject.

Comprehensive tests were made by Esso with high-compression engines in cars in city-suburban driving conditions. The cars burned fuels varying from 98 to 101½ octane ratings. The tests showed that combustion chamber deposits will continue to be a problem and that the effect of these deposits will be to increase the octane requirement.

One phase of this study showed that in terms of anti-knock, one unit of carbon deposit increase at the 99-octane level caused as much increase in knock intensity as six units at the 87-octane level.

The Esso tests also clearly showed that the higher compression ratios will mean some restriction in use due to surface ignition unless something is done to offset this factor.

The "digestive" ability of high compression was emphasized by Appeldoorn. Tests, he said, revealed considerable difference in octane requirement in design of the same compression ratio.

Heat is a problem . . . About five mechanical octane numbers have been built into engines in 4 years according to Raymond I. Potter, supervisor of fuels and lubricants research of Ford Motor Co.

This, Potter said, is roughly equivalent to what refiners have been able to do with better processing. Until he joined the Ford organization 4 months ago, Potter for many years was in charge of motor-fuel and lubricating-oil research for Standard Oil Co. (Ohio).

Potter's conclusions were based on experiments conducted by Ford in 1951 and 1955. Tests were made with clean engines and after they had been driven 3,000, 6,000, and 9,000 miles.

The main point here was that with the 1955 higher compression engines the increase in octane requirements (4.2 numbers after 9,000 miles), was about half what it was with 1951 models for the same mileage.

The trend toward higher Reid vapor pressures in motor fuels may cause trouble because of changes in body and engine design, Potter indicated. Regarding this he said:

"The petroleum industry may not be aware that heat emission from the gasoline power plant is becoming increasingly serious, and that lower hood lines in present models and in probably future models will result in smaller and hotter engine compartments.

"Closely packed accessories, such as power steering, high output generators, and in some cases air conditioning have filled underhood space and increased heat emission. We feel that tolerance for higher temperatures may be more important than extremely high octane numbers for premium gasoline in the immediate future."

Ad claims challenged . . . Dr. L. L. Withrow, head of fuels and lubricants department of General Motors research laboratories, questioned the accuracy of some of the claims made in the marketing of multiviscosity oils.

Their use has spread rapidly over the past 4 years until now it is estimated they represent about 50 per cent of the motor oils sold.

Withrow referred to advertisements claiming for the oils 15 per cent more mileage in gasoline, economy, stepped-up power, ease in starting, less wear of engine parts, and the use of one grade under all operating conditions.

Withrow said he did not doubt that all of the superior performances could be obtained under controlled operating conditions.

Withrow said that exaggerated claims for the oil was doing both the oil and automotive industry a disservice. He suggested additional research in the performance of the oils, which he agreed had been an important contribution to the solution of some of the lubrication problems of the engine manufacturers.

Better lubes ahead . . . Refiners have not reached the end in the improvement of lubricating oils for use in motor vehicles according to Charles M. Heinen, assistant managing engineer of Chrysler Corp.

Heinen said that hydraulic fluids for power steering and automatic transmissions have a requirement for improvement at lower temperatures, they also require greater resistance to heat and the problem of compatibility is becoming serious as temperatures rise.

The speaker listed four specific requirements in engine lubricants: (1) greater fluidity at lower temperatures; (2) increased resistance to heat; (3) greater load carrying ability, and (4) compatibility with more and more materials.

Transco to Expand

Part of construction plan is 36-in. looping program

HOUSTON. — Transcontinental Gas Pipe Line Corp. has filed application with the Federal Power Commission for a $38.5 million expansion of its natural-gas pipeline system from Texas to New York City. The new projects plus other work began in 1955 will bring construction outlay this year to $54 million.

Tom P. Walker, Transcontinental president, said the expansion will add 105 million cubic feet to the daily allocated capacity of the system. Early approval by the commission would provide 80 million cubic feet of the new capacity before the 1956-57 heating season. The other capacity would be completed in 1957.

Transcontinental's allocated capacity for the 1956-57 heating season would be 785 million cubic feet daily, supplemented by peak-day deliveries from present storage of 136 million. This will total 921 million cubic feet of available capacity.

A substantial portion of the increased capacity will serve the New York City-New Jersey market where Transcontinental is the major supplier. Deliveries also will be stepped up in the Piedmont area of the Carolinas and Georgia.

With completion slated early in '57 . . .

. . . Amoco's New Refinery Takes Shape

YORKTOWN, Va.—American Oil Co. is swinging into high gear on construction of its 35,000-bbl. per day refinery here.

Mark C. Hopkins, plant manager, reports the construction payroll has just passed the 1,250 mark at the 1,000-acre site near here.

Fractionating towers are going up for the combination two-stage crude distillation and fluid catalytic cracking unit. Charging 35,000 bbl. of crude, this unit also will handle 19,000 bbl. per day of topped crude in its vacuum stage. The Orthoflow catalytic cracking unit which is integrated with the crude unit will take a total feed of 30,600 bbl. per day comprising about 30 per cent recycle. M. W. Kellogg Co., contractor for this unit and for all auxiliary refining facilities, has the largest working force on the job right now.

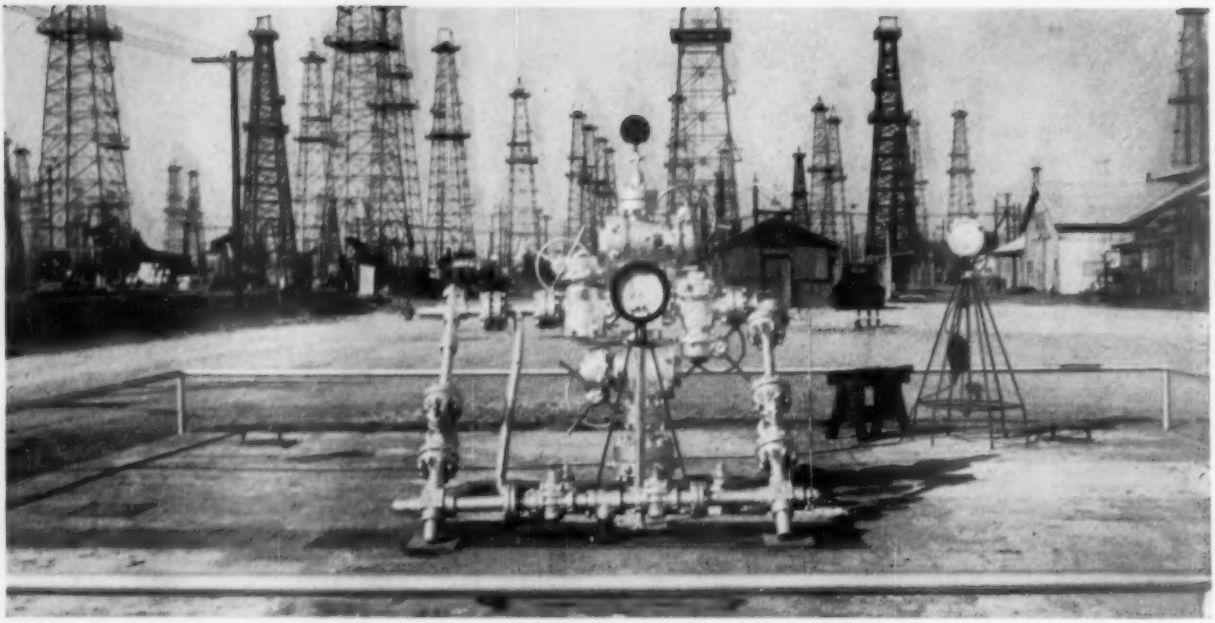
Lummus Co. is beginning construction of the 9,600-bbl. per day delayed-coking unit to convert heavy residual feed stocks to distillate fuels, plus 500 tons per day of petroleum coke.

By April 1, Ralph M. Parsons Co. will begin construction of a 7,600-bbl. per day Ultraforming unit and two catalytic hydrodesulfurization units. One will process 7,600 bbl. per day of naphtha feed stock for the catalytic reformer. The other will upgrade 15,000 bbl. per day of middle distillates.

Chicago Bridge & Iron Co. has completed 13 tanks and is hard at work on 12 additional ones. The contract calls for 63 individual tanks with a total capacity of 3,771,000 bbl., including the spherical units nearing completion for L.P.G. storage.

The $1,750,000 pier project is more than 95 per cent complete. This job, handled by the Tidewater Construction Co. of Norfolk, Va., includes a 3,000-ft. pier extending into the York River. It will accommodate a supertanker, a 550-ft. tanker, and two 250-ft. barges at the same time.

Full refinery operation is scheduled to be under way early next year.



CHRISTMAS TREE marks completion of deep strike signaling start of new boom in Santa Fe Springs field on Los Angeles outskirts. Forest of derricks of different types stand as reminder of two earlier booms more than a quarter century ago.

Santa Fe Springs Gets New Life at 37

LOS ANGELES.—An old California field that has produced over half a billion barrels of oil is starting the third boom in its 37-year history.

New life has been injected into the waning Santa Fe Springs field on the eastern outskirts of Los Angeles. The reason is General Petroleum Corp.'s deep strike, 243 Santa Fe, which came in for 1,776 bbl. daily of 30.9°-gravity crude.

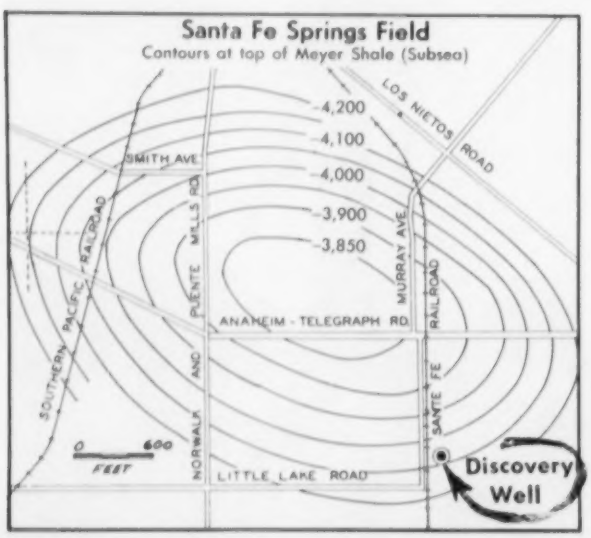
Production is from a new pay between 8,050 and 9,010 ft., deepest of the nine distinct oil zones found in the field. Deepest previous production was from the Hathaway at 7,950 ft.

The prolific strike has sparked a deep drilling pay that should bolster the dwindling reserves for Santa Fe Springs, now down to its last 50,000,000 bbl.

Within 2 weeks of the completion of 243 Santa Fe, 11 new tests or redrills were started to the new pay.

The well is located on the southeast flank of the field (see map). Most of the activity in the latest pay is expected to be east and south. Union Oil Co. drilled an 11,000-ft. dry hole 20 years ago 2,000 ft. northwest of the discovery.

First boom . . . Santa Fe Springs was discovered in 1919. But it wasn't until 4 years later that the field experienced the first of its two early-day booms.



DEEP DISCOVERY by General Petroleum opening ninth oil zone in the field spurs new drilling play.

GENERAL PETE LEADS WAY at 244 Santa Fe, first test after discovery, which made a record 2,205 ft. of hole in one 8-hour shift.

That came with development of the Foix, Bell, and Meyer zones. In August of 1923 production averaged 319,989 bbl. daily. The flush flow from these new pays in a field, which covered only 2 sq. miles, played havoc with the oil market all over the country.

The impact of the development was summed up in a report at that time prepared by R. R. Templeton and C. R. McCollom.

"During the past 2 months," the report stated, "Santa Fe Springs has produced more than 10,000,000 bbl. of oil per month, and production is now standing at about that figure."

The 1923 report continued:

"As a result, the industry in the Mid-Continent is almost paralyzed, the transportation and refining facilities of the Atlantic Coast are taxed to the limit, and the price of gasoline has been universally forced down to a point where only a few refiners are able to make a profit.

"This production, which represents about one-sixth of the production of the United States, is the more remarkable when it is considered that this tremendous flood of oil is coming from a field comprising only some 1,500 acres of proved oil land and that oil is coming from the heretofore unheard of depth of nearly a mile."

The new discovery is almost twice as deep.

Second boom . . . The huge oil flow of 1923 faded rapidly. By 1928, when the next boom was to start, it had dropped to 37,000 bbl. daily.

Then in July of 1923, Wilshire Oil Co. completed 1 Buckbee in a new zone at 5,860 ft. for 2,000 bbl. daily. And Santa Fe Springs was off again. A year later production had soared to 285,000 bbl. daily.

The field produced 558,840,000 bbl. through 1955 when the daily average was 12,000 bbl. from 575 wells.

Stratigraphically the field is made up of nine oil zones and a shallow gas zone. Seven of the oil zones, located between 3,500 and 7,500 ft., are Pliocene in age. The last two, Hathaway and the new Santa Fe, are Miocene.

Current play . . . General Petroleum leads the new drilling race.

General Pete, besides making the discovery, has a new well and a redrill job under way. The company is preparing two other locations with the deep zone as the objective.

Here is a rundown of other activity in the field:

. . . Bandini Petroleum Co. is drilling an offset 500 ft. from the discovery.

. . . Rothschild Oil Co. has two redrills going.

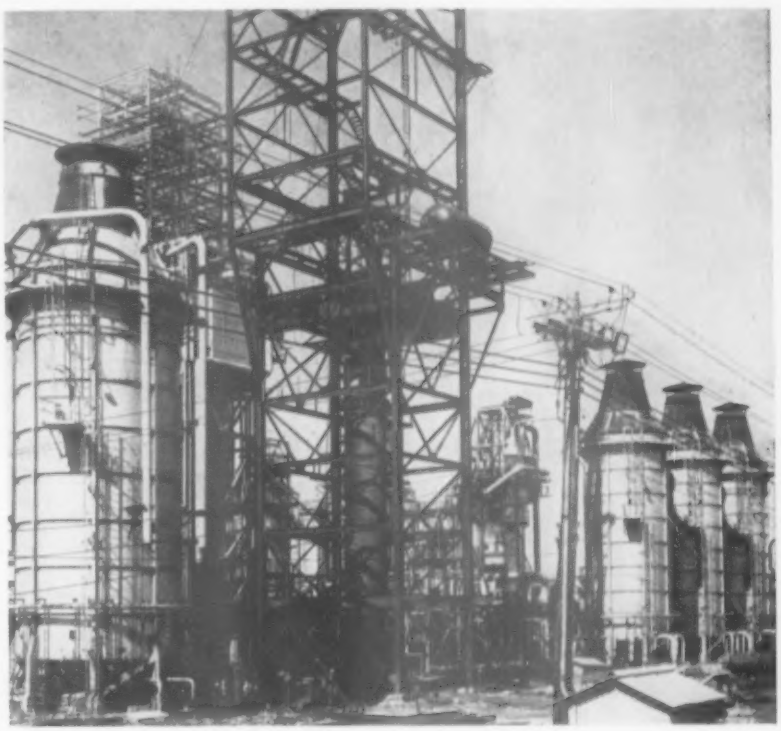
. . . Lake Oil Co. is deepening its 1 Lake to the new zone.

. . . Union Oil Co. is joining the action by deepening the 18 Farwell, now at 7,860 ft., on the Farwell lease near G.P.'s holdings.

. . . Standard Oil Co. of California is preparing to deepen three producers to the new zone.

. . . Roil, Inc., has staked location about a mile north of the discovery.

Ten companies besides General Petroleum hold acreage within a quarter of a mile of the discovery.



Hidalgo to Start Up Synthesis Plant

BROWNSVILLE, Tex.—Hidalgo Chemical Co. expects to start production of synthetic fuels and raw chemicals in April at the old Carthage Hydrocol, Inc., plant here, idle since June 1953.

Plagued by shutdowns under the former owners, the plant has been undergoing expansion and rehabilitation for 18 months by Stanolind Oil & Gas Co., Hidalgo owner, and Lummus Co., the prime contractor.

The second big gas generator, shown under construction here, has been completed and is being tested prior to starting operations. The last big job is modification of the reactors, the keys to the Fischer-Tropsch process employed in the hydrocarbon-synthesis plant.

Raw materials in the process are natural gas and oxygen, which is separated from the air in the world's largest plant of this type. The plant has a design capacity of 50,000,000 cu. ft. daily.

Up to 90,000,000 cu. ft. daily of natural gas will be burned with oxygen in the generators to produce synthesis gas. The synthetic gas, reacted in the presence of an iron catalyst, is converted into two streams of liquid fuels and chemicals.

The plant was designed to produce 6,000 bbl. of gasoline, 900 bbl. of diesel fuel, 200 bbl. of fuel oil, and 300,000 lb. of chemicals daily. The chemicals stream is separated at Stanolind's adjacent plant into alcohols, aldehydes, ketones, and acids.

Permian Basin Gas Sold

ANDREWS, Tex. — Permian Basin Pipeline Co. has contracted to buy up to 55,000,000 cu. ft. of natural gas daily from a Phillips Petroleum Co. gasoline plant being built 3 miles west of here.

First deliveries will be 25,000,000 cu. ft. daily, beginning July 2, and the take will be stepped up later. Permian is a subsidiary of Northern Natural Gas Co., Omaha, which sells over a billion cubic feet of gas daily in South Dakota, Nebraska, Minnesota, Kansas, and Iowa.

Kerr-McGee Stocks Make Big Board Debut

NEW YORK.—The stocks of Kerr-McGee Oil Industries, Inc., Oklahoma City, went up on the big board of the New York Stock Exchange recently amid smiles by both company and exchange officials.

U. S. Sen. Robert S. Kerr of Oklahoma, chairman of the firm, opened trading in the stock. He purchased 100 shares of Kerr-McGee common at 46½ for the trust fund of his son, William G. Kerr, 19. The company's preferred stock also is listed.

Kerr, shown at center above, then visited the trading floor of the exchange with Dean A. McGee, left, president of the company, and G. Keith Funston, right, exchange president. They are shown examining the quotations for the company's shares.

New reserve system to decide . . .

. . . Industry Man's Role in War

WASHINGTON.—Men in key jobs in the oil industry will be called into military service in the event of another war only as their particular skills are actually needed by the armed forces.

Such men will not be exempted from present induction and training. But when placed in the "ready reserve" after military service, they may be transferred to the "standby reserve" if not actually needed by the former in their industrial capacity.

The purpose of these transfers is to solve one of the most difficult problems created by an emergency—that of making a fair apportionment of skilled manpower between the armed forces and defense-supporting industries.

How system works . . . Congress last year set up the reserves as a backstop for the armed forces in the event of war. Men coming out of military service are assigned to the reserves for a stipulated period of years.

Keeping key men in vital industries was one of the most perplexing problems in the last war. To prevent its recurrence in another emergency, President Eisenhower issued an executive order in January for a continuous screening of men going into the "ready reserve."

The purpose of the order was twofold. It was intended to assure that the "ready reserve" could go into action without the confusion created by the necessity, at the last minute, of pulling out the men most needed by industry. And it was to insure that industry vital to defense could keep going without the disorganization created by the sudden loss of key workers.

A six-department committee has been working since January on a list of essential activities and critical occupations. So far it has decided upon 81 skilled occupations which will be critical to defense production and maintenance of minimum civilian requirements in a period of mobilization.

What jobs are essential . . . A number of key jobs in the oil industry have been placed on the critical list. They include:

. . . Chemists making analyses and investigations in the field of organic chemistry working with hydrocarbons or their derivatives.

. . . Cable and rotary drillers supervising set-up and drilling operations and operating rig controls.

. . . Engineers conducting engineering research or designing new or improved equipment.

. . . Geologists engaged in the location of oil, gas, and mineral deposits.

. . . Geophysicists employing research data to locate petroleum and mineral deposits.

. . . Oil-well servicing technicians. This includes electrical well service operators, acidizers, cementers, cementing-tool operators, formation-testing operators, perforators, side-wall-sample takers, explosives operators, and shooters.

. . . Batch and continuous still operators, stillmen, and treaters.

Gas Imports Growing

El Paso Natural boosting deliveries to California

LOS ANGELES.—Two contracts signed last week eventually will boost California imports of southwestern gas to 2,067,000,000 cu. ft. daily.

El Paso Natural Gas Co. made the contracts with three California utilities to step up its deliveries of gas. The agreements were with:

. . . Southern California and Southern Counties Gas companies. It calls for an additional 152,000 M.c.f. daily to be added to existing contracts. The two companies now receive about 890,000 M.c.f. daily. The new contract will bring southern California imports to 1,042,000,000 cu. ft. daily.

. . . Pacific Gas & Electric Co. It calls for El Paso to step up deliveries by 150,000 M.c.f. daily over existing contracts for 875,000 M.c.f. daily. This means P. G. & E. eventually will import 1,025,000,000 cu. ft. daily.

Both contracts are subject to approval by the California Public Utilities Commission and Federal Power Commission.

The two southern California utilities are waiting approval by the state commission to begin building a $30-million, 236-mile, 30-in. line from Topock, Ariz., to Newhall, Calif., to handle the increased imports. P. G. & E. also is scheduled to start a $20-million project this summer. It will parallel an additional 150 miles of its 502-mile, super-inch line from Topock to Milpitas.

U.P. Title Upheld

- Railroad wins fight for mineral rights under its right-of-way

DENVER.—Union Pacific Railroad's claims to oil and gas underlying a tract of right-of-way in Wyoming have been upheld by the U. S. Tenth Circuit Court of Appeals at Denver.

The three-judge court rejected the federal Government's claims to the oil, gas, and other minerals on railroad property near Borie, 11 miles west of Cheyenne, where U. P. plans to drill for oil.

The decision affairmed a December 1954 ruling by now-retired U. S. District Judge T. Blake Kennedy of Cheyenne. He had held that the railroad is entitled to develop and remove minerals under the right-of-way on the basis of the congressional act of July 1, 1862. The 1862 act granted U. P. a limited fee title to the right-of-way.

"The governmental policy in effect at the time of the U. P. grant was that a grant or conveyance in effect at the time of the U. P. grant was full title, including minerals," the Circuit Court decision stated.

"The policy of conveying the fee and reserving minerals to the U. S. was not fully developed until the passage of the stockraising and homestead law in 1916 and the leasing act of 1920.

"We conclude that the U. P., by the terms of the grant, received a limited fee title to its right-of-way and is entitled to remove the underground minerals."

The Circuit Court pointed out that the single question involved was whether the right-of-way grant conveyed the mineral titles to the railroad.

Key decision pending . . . Another suit challenging the U. P.'s claims to mineral rights, including oil and gas, on 160 acres of former right-of-way in northeastern Colorado has been taken under advisement at Sterling, Colo., by District Judge George Blickhahn *(The Oil and Gas Journal, February 27, page 88)*. His decision is expected in mid-May.

Sara M. Radke and Edward F. Karr, owners of the disputed acreage, contend U. P. holds no claims to the land. It's part of a tract originally granted to the railroad by congress between 1862-64 but sold in later years to finance construction of the line.

Judge Blickhahn's ruling will set a precedent for an estimated 16,000,000 acres of former U. P. right-of-way and uncounted millions of acres formerly owned by other railroads.

watching WASHINGTON

. . . with Bertram F. Linz

Executive reserve trained for emergency . . .

A "HARD CORE" of industrial experts to take over key jobs in Washington in the event of war is to be recruited by the Government.

Some 3,000 to 4,000 selected men will be trained to take emergency posts in the Interior, Defense, Commerce, and other departments. They would man the next war's counterparts of the Petroleum Administration for War, War Production Board, and other agencies administering the industrial, commercial, and labor controls needed in a time of full mobilization.

An executive order providing for the creation of a "national defense executive reserve" has been signed by President Eisenhower. Mobilization Director Arthur S. Flemming will have charge of the program.

In a "pilot" training program, about 40 executives from selected industries have already been instructed in government procedures, basic policies, and other elements of wartime operations. Men selected for the reserve will be volunteers. They must have the consent of their companies.

Labor spending may be probed, too . . .

CONGRESS is in an investigating mood.

The Senate alone has set aside $2,500,000 for special inquiries into a variety of matters. Directly or indirectly, the oil industry will have an interest in a number of these studies. And the House, on a lesser scale, also plans a number of probes.

The outstanding inquiry, of course, will be that on the influence exerted on Congress by special interests through campaign contributions and paid lobbyists. A bipartisan, eight-man Senate committee will have $350,000 for the job. Sparked by the furor over the $2,500 offered Senator Case of South Dakota, the investigation will start with the oil industry. But before it ends the committee also may focus the spotlight on labor unions which have spent lavishly to elect the "right" candidates.

Here is what other committees will have for studies that may interest the industry: government operations, $197,083 for review of government activities; commerce, $229,166 for industry practices and problems; judiciary, $41,250 for study of trading with the enemy; interior, $162,250 for a study of minerals, metals, and fuels; small business, $82,500 for problems of small concerns; and judiciary, $207,250 for antitrust investigations and $100,833 for a study of patent problems.

Mergers to be scrutinized more closely . . .

A NEW policy for dealing with the merger problem may be in the making at the Justice Department.

Under the policy, the department, once it had stepped in to halt the expansion program of a corporation, would keep the company under surveillance for a period of years.

Evidence of this approach was seen in a consent judgment recently secured against a shoe company that for several years has been buying up other manufacturing companies and retail outlets.

The company is barred, for a period of 5 years, from acquiring any manufacturing or retailing corporation except with the approval of the Government or a showing to the court that the merger will not substantially lessen competition or tend to create a monopoly.

Justice and Federal Trade Commission officials have long urged a law requiring companies to give them advance notice of proposed mergers so the monopoly aspects could be reviewed, as in the sale of the Government's synthetic-rubber plants. Lacking that, apparently, the department is prepared to apply that policy in at least the case of companies whose mergers it halts.

Pipeline building is at a high point. Will it slow down in 5 years?

. . . Top Pipeline Men Look at the Future

Larry Resen

HOUSTON. — The nation's natural-gas transmission industry is shifting gears. The booming construction era has hit a plateau. There's plenty of building yet to be done but the big emphasis now is on technological improvements to make the lines pay off.

These significant trends are apparent in answers given The Oil and Gas Journal by key gas-industry executives throughout the Southwest.

The leaders also add: Look for more transmission firms to enter petrochemicals and diversify their base of operations in allied fields. The big firms don't like all their eggs in one basket.

Here's the shape of things to come as forecast by the officials charged with doing the long-range thinking for their companies:

. . . **Emphasis on economy** of operations. Look for more unattended pipeline stations, large-diameter pipe, cleaner lines, more efficient compressors and pumps, and larger underground-storage capacity.

. . . **Construction.** Only a few cross-country transmission lines are yet to be built. The big field here lies in looping, doubling, or triple-laying existing lines, adding tie-ins and distribution systems.

. . . **Reserves.** There's no fear of running out of gas. Canada and Mexico offer sources of supply and there's plenty of virgin supplies left in this country if the climate is right for hunting them.

. . . **Prices.** They'll level off. Competing fuels actually are the controlling factor. The ceiling is believed 20 cents per M.c.f.

. . . **Regulation.** The problem here is to convince the Federal Power Commission that a healthy industry is the consumers' best protection. Then convince the FPC it must devise a more equitable rate base.

These are the questions and answers which revealed thinking in the industry:

Where will the emphasis be in achieving lower operating costs?

Several routes are possible—all with limitations. They include:

. . . **Unattended stations.** You can get manpower savings here but you can't afford to have too many mainline stations unattended. There's too much at stake if anything goes wrong. They'll have important application in field gathering systems.

. . . **Large-diameter pipe.** You can figure that 36-in. pipe will give you 60 per cent more capacity than 30-in. with only a 30 per cent increase in costs. But an important capacity question arises. It's questionable whether this size pipe is suitable on an entire route since the load factor will be too high. It's definitely in the picture, however, for looping programs and eliminating bottlenecks.

. . . **Cleaner lines.** This could make a difference in costs. The mills are helping by producing pickled plate which makes cleaning mill scale easier. With a new and clean pipeline, the emphasis will be toward cleaning and dehydrating facilities.

Are contractors making improvements which should lower building costs?

Improvements are being made but lower costs immediately are doubtful.

Contractors are using bigger equipment and better methods all the time. It's to their credit that they've been able to hold the line on costs. For instance, a new labor agreement in New Jersey will give tractor drivers more than $4 an hour.

Weather is always a big factor in contracts and will continue a high cost item. Station costs are tending upward because a large amount of labor must go into each station.

Where will improvements come, then, in construction?

Automatic welding and new-type pipe coatings stand high on the list.

Some mills already are double-jointing pipe automatically. They are trying to adapt this method to the construction gang. Field tests are under way on

external coatings of plastics. The trend seems to be toward a modest coating of plastic supplemented by cathodic protection. Economics will dictate just what the balance will be. You can cathodically protect bare pipe if you want to go to the expense. A stronger tensile-strength steel also would be a tremendous saving in steel costs. It will involve chemical research with alloys.

Where is pipeline technology headed?

Centrifugal compressors definitely are coming into the picture in a big way. These and improved engines promise cheaper and easier moving of gas. The gas turbine has its place here, too, and should fit in where its characteristics are most desirable. Improvements in reciprocating engines also are coming up. Thermal efficiencies will continue to climb.

Is the growth of underground storage stabilized?

Decidely not. It's an important factor to all companies. Pipelines are faced with growing demands and high-peak loads. It's much cheaper to get the gas to the consumer from nearby storage fields. The search for storage reservoirs in the "backyard" of consuming areas is continuing.

Does management think there'll be an increase in number of extraction and petrochemical plants built adjacent to pipelines near consuming areas?

There's a sharp divergence of opinion on this. Generally, it appears growth will be limited in this field. Current plants are built on rich streams. Pipelines handling leaner gas with less C_2 and C_3 components have to avoid stripping the streams to the point where B.t.u. content becomes too low.

Will more companies diversify into refining, petrochemical operations and other fields such as typified by Tennessee Gas Transmission and El Paso Natural Gas?

This trend should continue. It's partly related to the rate-base system. Under it, a company's earnings are tied to invested capital less depreciation.

There's another reason for broadening a company's base. Gas transmission company operations are based on high-load factors. If these should drop, a diversified base would soften the loss brought on by lighter loads. Of course, there will be some companies which will prefer to remain exclusively in the transmission field.

Now as to new construction, have all the major pipeline routes already been built?

On the face, the U. S. is pretty well covered with gas pipelines. One has been proposed now for Florida; and New England is the one other obvious route.

But someone still may advance a new idea which will require a cross-country line. This is true of Midwestern's plan to bring Canadian gas through the U. S. Midwest and of a Peoples Gas project to get Rocky Mountain gas into the Chicago area. New fields in the Rockies and possible development of gas reserves in new areas promise growth in major tie-in systems.

Will there be a leveling off in gas-transmission line building then?

With the high rate of construction now going on, it appears building is at a plateau. There'll be continued expansions and the building pace should keep up for the next 5 years. Then there should be a slow down.

The market pattern is this: The East and Midwest are pretty well saturated with mainline systems. But these also are the areas showing the greatest population growth in numbers. So there will have to be doubletracking or looping of the gas lines to accommodate the growth in demand.

Within 10 years, you'll probably see more compressor horsepower sold for field use than anywhere else. Pressure declines will make this necessary to maintain high-volume withdrawals.

Will U. S. gas reserves hold up to this big demand?

There's enough gas to be found in the U. S. to satisfy several generations even at increased demand. While there have not been any big fields discovered recently to rival the Katy, Hugoton, and Panhandle fields, there is still plenty of gas to be found. View the possibilities of unexplored areas in the far Southwest, Northwest, Rockies, and offshore.

Will Canadian and Mexican gas bolster our reserves?

Canada stands to become a major supplier of gas to the nation. There's no sizable market for the tremendous resources being developed there. Economics will prevail ultimately to move this gas into the U. S.

Mexico, however, brings out mixed emotions. Mexico has a history of expropriation to live down before many companies will feel free to become involved. Also increased Mexican demand may limit the amount of gas exports. The industry naturally will watch closely Texas Eastern's deal to bring in Mexican gas as a guide to the future.

Where are gas prices going?

Some customers think they've already gone too high. But there'll have to be a leveling off because of competition from oil and coal. This is more aggravated in the East where oil already is laid down in ports at competitive prices. The St. Lawrence Seaway will bring oil to the doorstep of the Midwest and directly compete with gas. Most economists in the industry feel that gas should be priced on a competitive B.t.u. basis with other fuels.

What would be a practical and fair price for gas?

On a B.t.u. basis, the 16-20-cent contracts which have been made still are too low compared to other fuels. But the 20-cent mark appears to be a ceiling.

Offshore production is expensive. Should this entitle the operator to a premium for offshore gas?

Definitely not. To the consumer an M.c.f. is an M.c.f. no matter where it comes from. Hence, gas has to compete in price wherever it's found. If a premium were paid, it would be for an especially large block of available production rather than its location.

If onshore sources should dry up in the future, then offshore gas might be priced at a premium. But this would be based on supply and demand rather than cost of finding it. Actually any price premium would be a double one because offshore gas is harder to get to and more expensive to move. Other factors, however, may work to offset the high costs to the offshore producer. The substantial pools he might find and the higher rates at which he can produce will help his profit picture.

But in all events, fundamental economics will prevail to keep offshore prices in line with those from onshore areas.

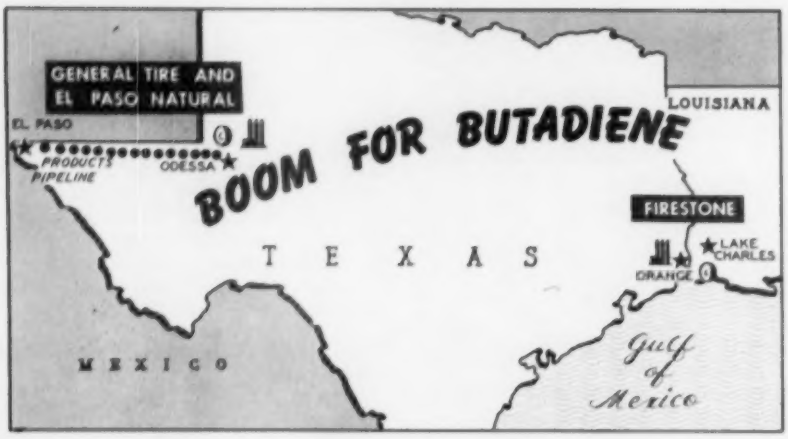
Is gasification of coal getting any serious study?

As a long-range idea, yes; but only if the hunt for natural gas should become uneconomical.

Pipelines often traverse coal-producing regions. What's wrong with gasification plants at the mines or underground gasification of coal, with the gas then being moved through existing pipelines?

What steps do you think should be taken to benefit the industry?

Small gas fields close to a transmission line or gathering system should be tied in if at all possible. The diminishing rate base should be changed by the FPC in determining a pipeline's returns.



Two New Giants for Texas

● Firestone will produce its own butadiene at Orange; start also near for rubber-chemical complex at Odessa

TWO giant petrochemical-rubber facilities will start rising in Texas this spring.

Firestone Tire & Rubber Co. announced last week it will build a 40,000-ton-capacity butadiene plant near Orange on the Gulf Coast. A 1,000-acre site has been purchased. Construction will start early in May.

A four-company combine also revealed work will begin late in May on a $30-million butadiene-synthetic rubber plant complex near Odessa in far West Texas. Participants will be El Paso Natural Gas Co., Odessa Natural Gas Co., United Carbon Co., and General Tire & Rubber Co. *(The Oil and Gas Journal, December 26, 1955, page 123).*

Both moves point out the growing concern of the rubber industry to assure its supply of butadiene for the ever-increasing demand for synthetic rubbers. It also emphasizes once more the obvious ties between oil, petrochemicals, and rubber.

Details on the new plants also came just as American producers of synthetic rubber set a new record.

Production in January was 93,485 long tons of synthetic rubbers. This compared with 90,319 long tons produced in December and tops the previous record of 91,281 long tons made in November.

Consumption of new rubbers also continued high. During January 133,335 long tons of all types were consumed. Of this 79,648 long tons, or 59.7 per cent, were synthetic rubbers. Consumption of synthetics at this time a year ago was 68,456 long tons.

Firestone plan . . . The Orange butadiene plant will be the initial step in a planned invasion of petrochemicals by Firestone.

The company is also expanding its Pottstown, Pa., chemical-making facilities and plans to turn out other petrochemicals at Orange later.

Harvey S. Firestone, Jr., company chairman, declared the Orange plant will provide Firestone with much of the butadiene requirements for its synthetic-rubber plants at nearby Lake Charles, La., and at Akron, Ohio.

Firestone has been purchasing its butadiene for synthetic rubber on the open market. The new plant eventually will substantially reduce these purchases. Historically, Firestone has produced much of its raw rubber. It is rated the largest producer of rubber in the world with extensive natural rubber plantations in Liberia, West Africa.

With the advent of synthetics, Firestone's integrated position was altered. The new butadiene plant now will make Firestone a producer of both natural and synthetic-rubber raw materials.

The plant . . . Catalytic Construction Co. of Philadelphia has the contract for design and construction of the new plant.

Although cost of the butadiene plant was not announced, Firestone said frankly it will be the first unit of a petrochemical complex. The plant will be located in the industrial area southwest of Orange and initially will employ more than 300 persons. This will be increased with subsequent expansions.

Butane, the principal raw material for the butadiene works, will be readily available in the petroleum-rich area. Firestone reported the butane would come directly from a network of pipelines throughout Texas but declined to name its supplier.

Something new . . . The Odessa facilities will be the first of their kind for West Texas. Their operation also will be radically different from other unions of petroleum producers and rubber firms.

The plants will consume roughly 32,000 short tons of butadiene and 20,000,000 lb. of styrene annually to make 40,000 long tons of synthetic rubber.

Raw material will be furnished largely by El Paso Natural with a stream of natural-gas liquids which has swelled to around 25,000 bbl. daily. General Tire & Rubber will supply the rubber-making know-how, employing a streamlined process which the company says will assure it a good competitive position in the business.

Actually, there will be two plants. The butadiene plant will cost $20,000,000. It will be built by Odessa Butadiene Co.—a combine of El Paso Natural, Odessa Natural, and United Carbon. It is believed El Paso holds controlling interest.

This plant will process about 175,000 gal. a day of mixed butanes into 135,000 gal. of normal butane and 45,000 gal. of isobutane. The normal butane will be used as raw material to make 150 tons or more of butadiene a day.

The second part of the operation will be a copolymer plant owned by General Tire. This unit will cost $10,000,000 and will operate on butadiene supplied by the other unit.

Bright future . . . The Odessa butadiene-rubber complex will be ready to go on stream about June 1, 1957, and may be the center of attraction for other petrochemical plants in the area.

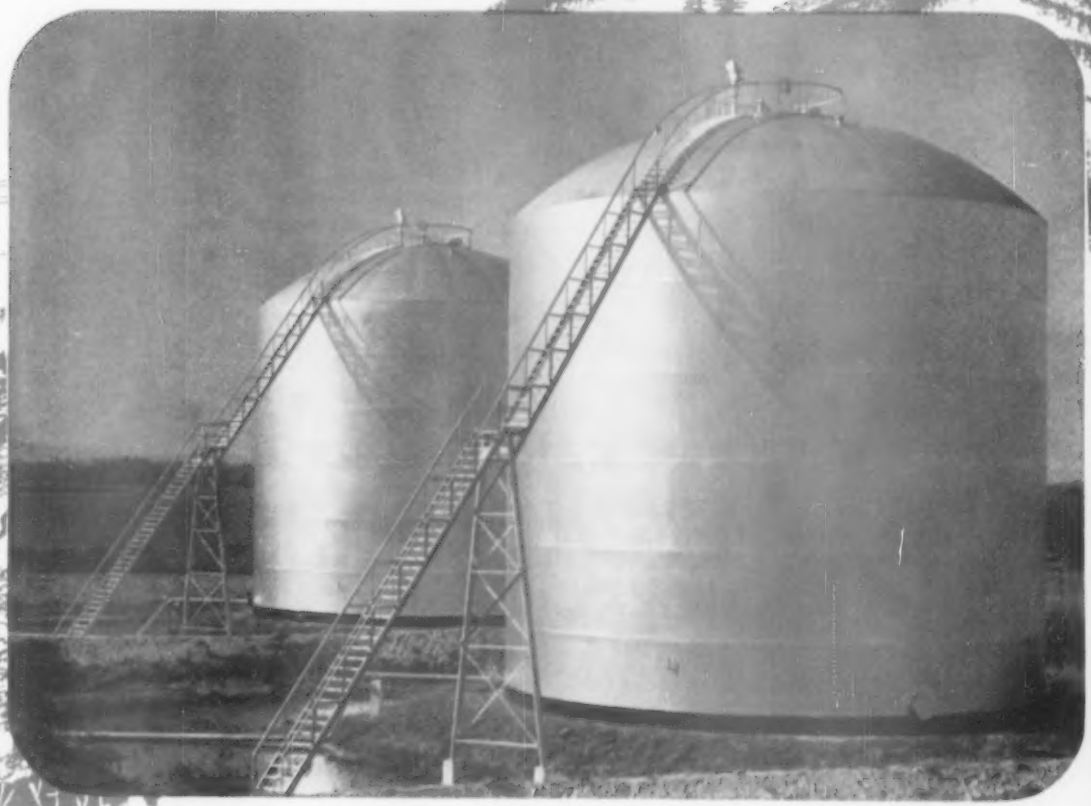
The byproducts of the operation could be used as raw material for plants making other end products. These byproducts will include the isobutane and considerable hydrogen—enough to make around 175 tons a day of anhydrous ammonia, for instance.

The isobutane likely will be taken by El Paso Natural. The company recently announced it would build a 240-mile "larger-than-6-in." products line from the Permian basin to El Paso. This line would feed natural-gas liquids to a projected alkylation plant located somewhere along the line.

The alkylate then would go through the line to El Paso where it would be blended at a projected new blending plant into premium motor fuel with regular motor gasoline arriving from a recently acquired refinery at Brickland, N. M.

STORAGE TIME

in the Green Mountain land



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Horton Hemispheroids prevent excessive evaporation of volatile liquids as long as the internal pressure in the tank does not exceed the pressure relief settings of the valves. They are built in capacities to 30,000 bbls. and for working pressure to 5 lbs. per sq. in. in the smaller sizes.

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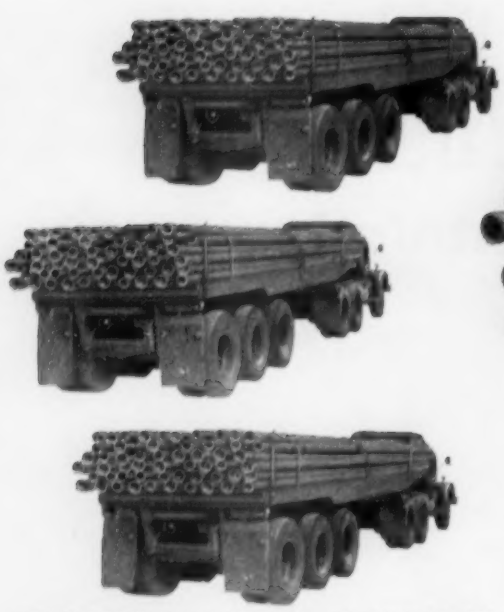
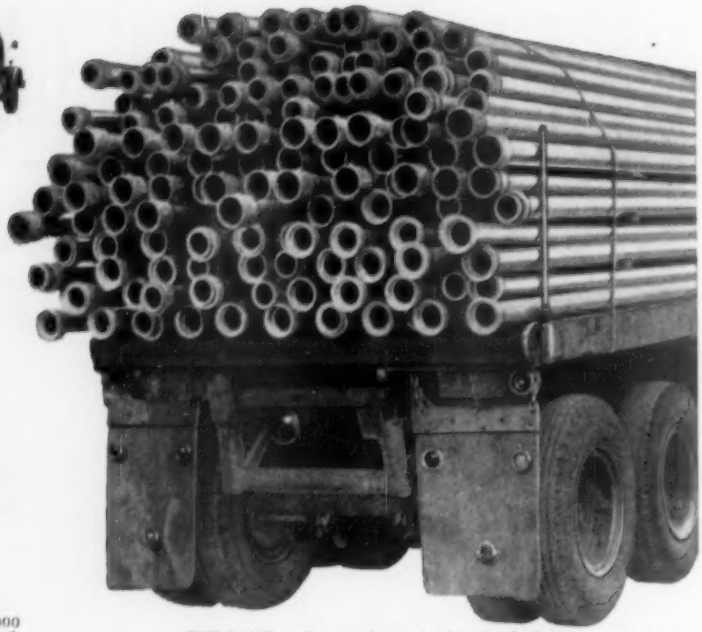


THESE THREE TRUCKS, each with a maximum load limit of 18,000 pounds, are loaded to capacity with 55 lengths of 30-foot, 4-inch steel pipe. Total weight of the steel pipe is over 53,500 pounds—barely within load limits! Total pipe footage—only 4,950 feet, substantially less than a mile!



THIS TRUCK, with a maximum load limit of 18,000 pounds, is loaded with 176 lengths of 30-foot, 4-inch Kaiser Aluminum pipe! Total weight of the pipe is about 5,500 pounds—well within the load limit! Total pipe footage—one full mile!

ONE TRUCK CARRIES A FULL MILE OF LIGHTWEIGHT KAISER ALUMINUM PIPE!

As YOU can see from the pictures on this page, load limit based on weight is *not a factor* with lightweight Kaiser Aluminum petroleum pipe.

At least three trucks are required to haul a mile of commonly used steel pipe. But this same footage can be hauled *easily with only one truck* when you use Kaiser Aluminum pipe!

With Kaiser Aluminum pipe you cut the cost of hauling by two-thirds!

And this is only *part* of the savings you get when you use the Kaiser Aluminum pipe and coupler system for your supply lines. Newly developed detachable couplers speed connecting and disconnecting time to give you additional savings of $135.48 per mile! And the light weight of Kaiser Aluminum pipe permits extremely fast handling, resulting in savings up to $84.35 per mile on loading, stringing and pickup!

Your nearby supplier stocks Kaiser Aluminum petroleum pipe in 30-foot lengths of 2, 3 and 4 inch diameters, with cladded inside surfaces for added corrosion resistance. He also has couplers and fittings to complete your system.

For further information, contact the Kaiser Aluminum sales office listed in your telephone directory or any of the fitting manufacturers listed below. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Ill.; *Executive Office*, Kaiser Bldg., Oakland 12, California.

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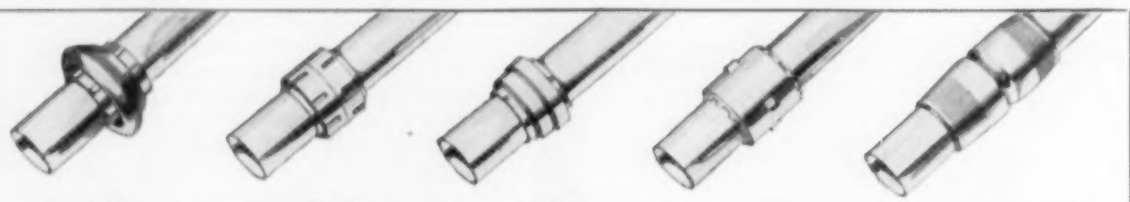

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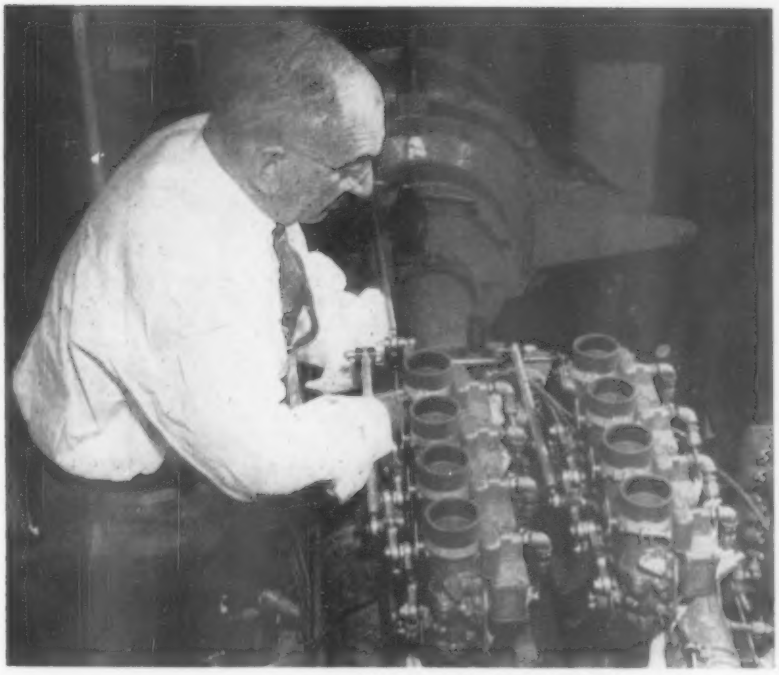
THESE FIVE tested and approved fittings require no welding: field tie-in to existing systems may be accomplished quickly and easily. Couplers assure leakproof connections at liquid and gas pressures of 0 to 1000 psi.



Hot Rodder's Dream: Eight Carburetors

LINDEN, N. J.—Many motorists are familiar with dual carburetors.

But how about an engine with eight carburetors?

Mechanics at the Esso Research Center here have built the special carburetion for a test engine. It will premit researchers to test eight different gasoline blends at the same time.

Each fuel can be given a performance rating and compared with the others during runs in the laboratory.

But that isn't all. Esso also is conducting laboratory and road tests with a European car which has no carburetor. The European car is equipped with fuel injection to determine the advantages or disadvantages of this system.

Doubling of U. S. Demand Seen by 1980

DENVER.—The United States faces the task of locating 100 billion barrels of recoverable oil to meet a whopping domestic demand of 6 billion barrels yearly by 1980.

That's the forecast of F. A. Thurman, outgoing president of the Rocky Mountain section, American Association of Petroleum Geologists. Thurman spoke at the section's sixth annual meeting here last week.

Acquiring that much oil, he told the geologists, means finding "the equivalent of a Rangely field each month or an Adena field every 5 days."

But he charged those who talk of supply shortage in years to come with failing to look clearly at the free-world situation. Such a look, he said, would show total reserves of 148 billion barrels. Added to our own 35 million barrels of reserves, he declared, this is plenty of oil discovered to meet free-world demand for the next 25 years.

Thurman predicted some of the demand will be met by finding new methods to recover the 180 billion barrels now considered "unrecoverable." He also contended "hundreds of billions of barrels" are locked in the nation's oil shales and sands.

Thurman told the geologists their traditional conservative approach "will not provide the oil of the future."

"Geological fundamentals don't change, but our interpretation of them is subject to daily revision," he said. "Most of us were schooled and trained in conservatism, taught by the inexactness of our science to 'hedge our bets' and qualify our statements.

"Now, few prospects are perfect and too often we condemn them without a second thought to a new approach.

"Instead," he urged, "we must strive for more positive geological thinking and be willing to chance a calculated risk."

Unit Lifts Octane

Middle East naphtha upped to 97 clear by Ultraformer

MONTREAL.—The highest commercial octane numbers ever realized from a straightrun Middle East naphtha have been obtained here by Canadian Petrofina, Ltd., in a new 3,600-bbl. Ultraforming unit.

A 40-octane number feed produced a C_5-plus product with octane rating as high as 97 research clear. In a test period February 3 to 21, the unit was run 9 days at 93-octane level, then product quality was carried higher to test flexibility. It was held for 12 hours at the 97-octane level.

The unit gave anticipated product yields, but the hydrogen yield far exceeded expectations.

Feed stock was a full boiling range Kuwait naphtha. Because they are highly paraffinic, Middle East naphthas are generally difficult to upgrade.

Gulf Coast octanes higher . . . Other naphthas higher in naphthenic content have been Ultraformed to 100-octane clear product.

An example is American Oil Co.'s 21,000-bbl. per day Texas City unit. This unit has been operating for a year and is now making 100-clear octane reformate from Gulf Coast naphthas. Catalyst in this unit has undergone more than 50 complete regeneration cycles.

There are 24 Ultraformers now operating, under construction, or planned throughout the world. They range in size from 2,000 to 22,000 bbl. per day with aggregate capacity of 238,000 bbl. per day. Ultraforming is licensed jointly by Standard Oil Co. (Ind.) and Esso Research & Engineering Co.

Imperial to Expand Line

TORONTO.—Imperial Oil, Ltd., will boost capacity of its Sarnia-Toronto products pipeline by one-third.

Bids have been asked for construction of a 12-in. line to parallel the present line from Waterdown, Ont., to the new North Toronto terminal. This 38-mile loop will make possible delivery of an additional 12,600-bbl. daily of product to Toronto.

New pumping equipment at Sarnia, London, and Waterdown will boost capacity of the whole line by 21,000 bbl., bringing the total to 76,000 bbl. per day. The project will cost about $1,750,000. Completion is expected by September.

The pipeline moves gasoline and other products 195 miles from Imperial's Sarnia refinery to Toronto.

Suit To Test Patent

Stanolind, Magnolia square off over Hydrafrac process

TULSA.—Stanolind Oil & Gas Co. and Magnolia Petroleum Co. are squaring off for an important legal battle in federal district court here over Hydrafrac, Stanolind's patented process for formation fracturing.

The process consists of fracturing a hard and tight oil-bearing formation by forcing a mixture of oil and sand into the formation at high pressure.

Stanolind is bringing suit against Magnolia claiming it is infringing the patent and refusing to pay Stanolind royalties for using the process.

The original suit was filed in 1955 at Muskogee but was transferred here late last year. After a hearing here in mid-January before Judge Royce Savage, Stanolind attorneys filed an amended petition February 21. Judge Savage then gave counsel for Magnolia 20 days to file an answering brief.

The arguments . . . Stanolind in its amended petition stated that prior to April 2, 1954, Magnolia used the licensed process and paid royalties through service companies it employed to do the fracturing work. On that date, Stanolind said Magnolia discontinued paying the royalties but still contracted with well service firms for the work.

Magnolia claims an engineering survey of its wells subjected to Hydrafrac injections showed that formation fracturing was not involved. It says the charges for patent royalties thus are improper and argues that operations on its wells are not covered by the patent held by Stanolind.

Stanolind is asking Judge Savage to declare that the fracturing operation on certain wells are covered by the patent and to decree that Magnolia is infringing. It further asks that Magnolia be enjoined from further infringement and make an accounting for royalties due.

Outcome of the suit will be important to the industry. Thousands of oil wells are subjected to fracturing each year. Twenty-eight different well-servicing companies are licensed to perform the Hydrafrac process. Royalty fee for each well is reported at about $44.

Drilling Giant Contracted

CORPUS CHRISTI.—A mobile platform bigger than "Mr. Gus" and which will drill in 140 ft. of water was ordered last week by Glasscock Drilling Co.

Contract was awarded to Bethlehem Steel Co. The unit will be built by Bethlehem's shipbuilding division at Beaumont and is due for completion before next January 1.

The new platform will have three decks. Over-all dimensions of the upper deck will be 258 by 104 ft., including a helicopter landing deck. The foundation platform, or mat, will measure 180 by 200 ft.

Glasscock said the platform is a self-contained unit designed for quick moves.

Gas Area Yields Oil

Gulf has good prospect in Pecos County wildcat

FORT STOCKTON.—West Texas wildcatters suddenly took a new interest in the big Puckett gas field in Pecos County last week. A flow of oil was reported on a drill-stem test of an important test at the edge of the field.

The prospective oil producer is Gulf Oil Corp. 1-A Robbins Gas Unit. It is located 30 miles south of nearest oil production in the old Permian areas on the Central basin platform and is 40 miles southwest of Sheffield field.

The well flowed an estimated 40 bbl. of oil in 1 hour through ¾-in. choke from 10,129-77 ft. The section was tested through drill stem and definite identification was not made. Operators thought it could be a Pennsylvanian or Devonian formation.

Gravity of the oil was 42.8°. Bottom-hole flowing pressure was 1,375 psi. and 15-minute shut-in pressure reached 1,670 psi. Recovery in the pipe was clean oil with no formation water.

A second test from 10,129-92 ft., total depth, had flowing oil in 2 hours and 35 minutes. It flowed into pits for 15 minutes, then tanked 13.79 bbl. of oil in 30 minutes. Gas-oil ratio was 982:1.

Tentative correlation on the 1-A Robbins places it 100 ft. high to Phillips Petroleum Co.'s 1 Evelynjo, nearest Ellenburger well, 1 mile south. Geological location of the well is in the transitional zone between the Delaware and Midland basins.

Gas Plant Planned

$18-million Peace River unit to use cat reforming

CALGARY.—An $18-million natural-gas treating plant employing the latest catalytic reforming process will be built in the Peace River area by Pacific Petroleums, Ltd.

The plant will process up to 300 million cubic feet daily of Peace River gas before delivering it to Westcoast Transmission Co., Ltd., for piping through British Columbia to the Pacific Northwest Pipe Line Co. in the United States.

Site has been purchased at Taylor Flats on the north bank of the Peace River near Fort St. John. Final design plans are being drawn and construction bids are out. Financing arrangements also are being made to allow construction to start this year so operations can begin next year.

The plant will combine gas treating, condensate dehydration, hydrocarbon recovery, catalytic reforming, and sulfur recovery into an integrated process. It is important to the natural-gas industry because it marks another plant which has turned to catalytic reforming.

Byproducts of the operation include 275 tons of sulfur, 1,700 bbl. of gasoline, 500 bbl. of diesel oil, 300 bbl. of propane, and 600 bbl. of butane daily.

Gas for Carolinas

Proposed line would move 40,000,000 cu. ft. daily

RALEIGH, N. C.—Trans-Carolina Pipeline Corp. has asked Federal Power Commission authority to build a 300-mile natural-gas pipeline across North and South Carolina.

The company plans to deliver 40,000,000 cu. ft. daily, purchased from Transcontinental Gas Pipeline Corp., to 40 cities and towns.

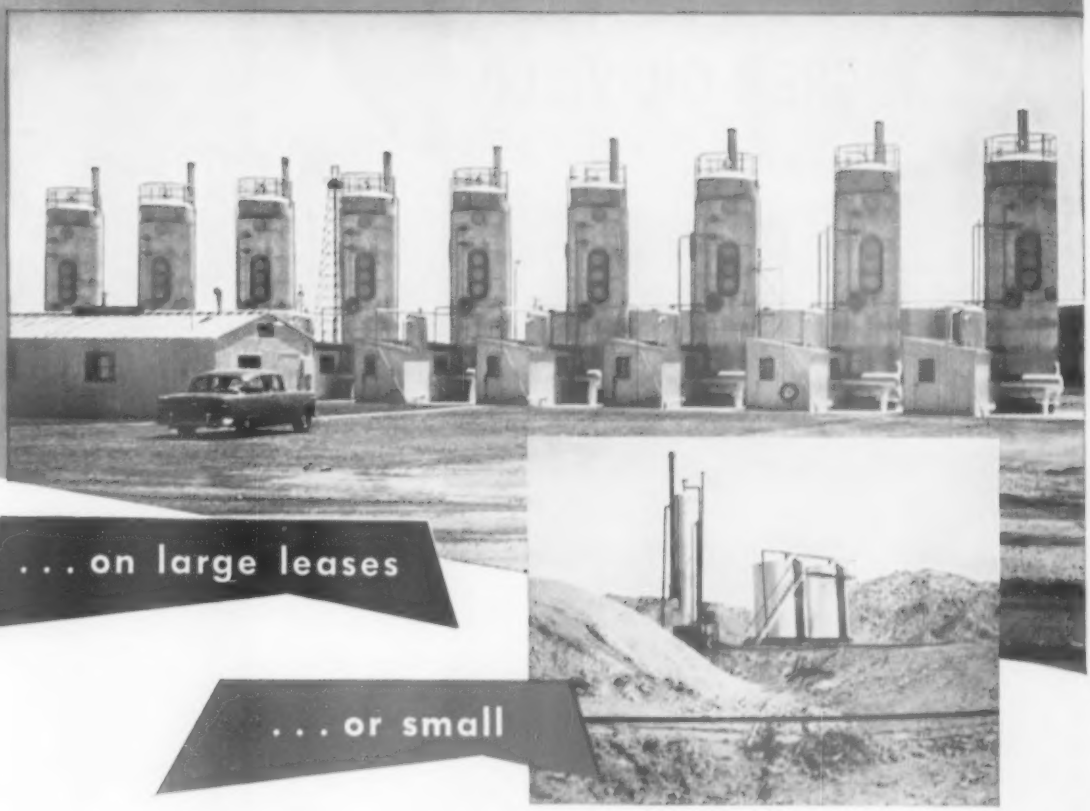
The project, including over 500 miles of laterals, would cost $22,000,000.

Transco has asked the FPC for a permit to expand its Texas-New York system to provide Trans-Carolina's requirements. The gas would be available late this year or early in 1957.

Trans-Carolina estimates actual construction would require 15 months. The company expects to start service on the section west of Hamlet, N. C., within 6 months after work begins. Thirteen cities along the route will convert their manufactured-gas distribution systems to natural gas.

The area which the line would serve is one of the largest along the Atlantic Seaboard still without natural gas.

Visco CUTS EMULSION-BREAKER COSTS



. . . on large leases

. . . or small

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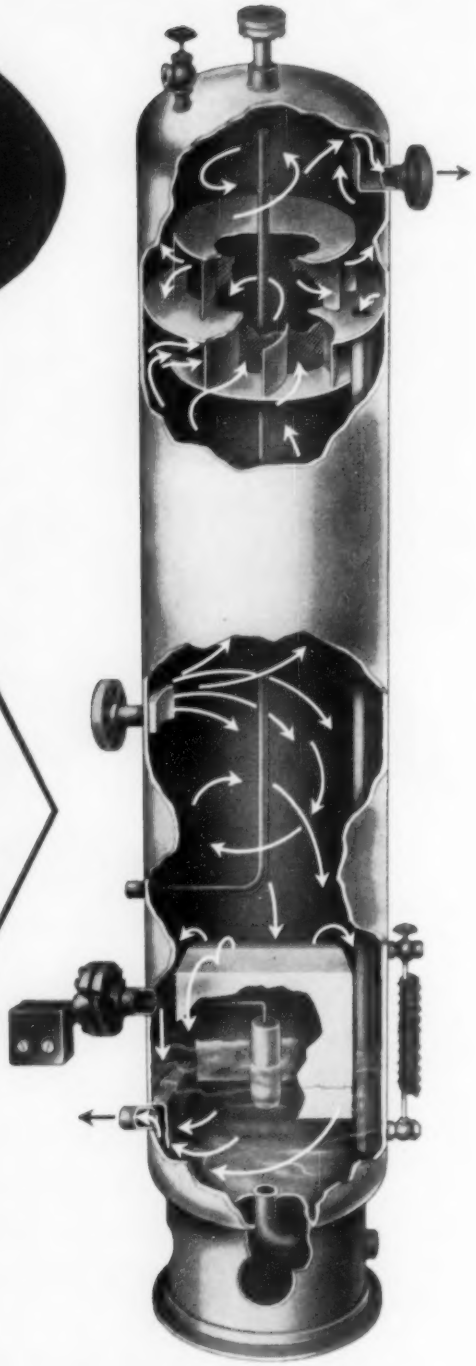

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Output Hits New High

Record U. S. production boosts free world to new mark of 14,375,300 bbl. daily despite Middle East decline

FREE-WORLD crude production was at an all-time high in December despite a decline of 69,800 bbl. daily in the Middle East.

The total of 14,375,300 bbl. daily was largely due to a record 7,155,000 bbl. daily in the United States, an increase of 142,000 bbl. over November. It was the second month in a row that U. S. output passed the 7,000,000 bbl. daily mark.

Total production in free-world countries outside the United States averaged 7,220,300 bbl. daily, off 28,000 bbl. from the previous month. The decline was registered in Saudi Arabia, Kuwait, and Iran. But two other major exporting countries, Venezuela and Iraq, had higher output than ever before.

Production in Venezuela of 2,291,800 bbl. daily was up 32,300 bbl. over the previous month and 134,600 bbl. over the year's average. The month's output raised the 1955 final average to 2,157,200 bbl. daily, up 13.8 per cent, or 261,900 bbl. daily over 1955.

Iraq flow rises . . . In Iraq, Iraq Petroleum Co., Ltd., and its affiliated companies produced 729,100 bbl. daily, up 56,400 bbl. from the previous month and 48,900 bbl. over the yearly average of 680,200 bbl. daily. The 1955 level was up 10.5 per cent over 1954. The December record was due to a peak month for Kirkuk, one of the world's great fields, producing since 1927. Production in December averaged 538,400 bbl. daily from about 44 flowing wells, or better than 12,000 bbl. daily per well.

In other Middle East countries, Saudi Arabian production remained above 1,000,000 bbl. daily although it dipped 12,900 bbl. from the previous month to 1,028,200 bbl. daily. The output of the final 3 months of over 1,000,000 bbl. daily pulled up the year's average to 965,000 bbl. daily, or 12,000 bbl. above 1954. Earlier last year, there were predictions that output would fall short of 1954.

Iranian production averaged 344,000 bbl. daily, down 43,000 bbl. from November. This includes 4,000 bbl. daily not produced by the consortium.

Kuwait produced 1,028,000 bbl. daily, 63,500 bbl. below the previous month and 64,600 bbl. daily off the yearly average. On a 12-month basis, Kuwait was up 140,300 bbl. daily, or 14.7 per cent, over 1954.

The Middle East's newest exporter, the Neutral Zone, had a 1955 average of 24,200 bbl. daily, up 55 per cent from 1954.

Turkey, Italy increase . . . In Turkey, production currently averages about 5,000 bbl. daily, all of which comes from Raman field in the southeastern part of the country. Garzan field, located in the same vicinity, is shut in pending the construction of a pipeline to Raman. Raman supplies the newly completed 7,000-bbl. daily refinery at Batman.

Development of Gulf Oil Corp.'s Ragusa field in Sicily raised total Italian output 1,000 bbl. daily to a new high of 6,900 bbl. daily in December.

TRENDS OVER THE LAST YEAR

	Western Hemisphere less U. S.	Middle East	Total non-Communist countries
1954—December	2,962.8	3,003.8	6,501.8
1954—January	3,001.5	2,950.1	6,442.5
February	3,050.4	3,109.3	6,653.8
March	3,036.0	3,247.9	6,775.8
April	2,981.6	3,327.6	6,805.9
May	2,932.1	3,287.4	6,718.8
June	3,019.7	3,201.6	6,720.9
July	3,092.7	3,275.8	6,872.1
August	3,140.4	3,243.0	6,978.2
September	3,130.9	3,256.9	6,990.7
October	3,179.6	3,378.2	7,166.0
November	3,255.0	3,386.0	7,248.3
December	3,294.7	3,316.2	7,220.3

CRUDE-OIL PRODUCTION
(Daily average in thousands of barrels)

Country—	Dec. 1955	Nov. 1955	Dec. 1954
W. Hemisphere:			
Argentina	85.7	85.7	92.1
Bolivia	7.9	7.9	6.2
Brazil	6.8	6.3	4.3
Canada	405.0	410.5	311.1
Chile	8.5	8.5	6.0
Colombia	117.1	112.4	98.1
Cuba	1.5	1.4	0.4
Ecuador	10.0	10.0	9.2
Mexico	240.9	233.1	237.5
Peru	47.8	46.7	47.3
Trinidad	72.6	73.0	67.3
Venezuela	2,291.8	2,259.5	2,083.3
Total	3,294.7	3,255.0	2,962.8
W. Europe and Africa:			
Algeria	1.0	1.0	1.4
Austria*	67.7	67.7	
France	22.5	21.9	13.0
Fr. Morocco	2.0	2.0	2.2
W. Germany	64.4	64.0	55.3
Italy	6.9	5.9	1.4
Netherlands	19.3	19.6	18.5
Egypt	37.3	36.7	36.8
United Kingdom	1.2	1.2	1.2
Yugoslavia	5.1	4.9	23.6
Turkey	5.0	5.0	2.0
Total	232.4	229.9	155.4
Middle East:			
Bahrain	30.1	30.1	30.1
Iran†	344.0	387.0	191.0
Iraq	741.1	684.7	650.7
Kuwait	1,028.0	1,091.5	1,015.1
Neutral Zone	30.0	30.0	24.0
Qatar	114.8	121.6	108.1
Saudi Arabia	1,028.2	1,041.1	984.8
Total	3,316.2	3,386.0	3,003.8
Other Asia:			
British Borneo	110.0	110.0	99.7
Burma	4.0	4.0	3.7
India	7.5	7.5	7.0
Indonesia	236.0	236.0	245.7
Japan	6.2	6.3	6.0
New Guinea	7.6	7.9	12.4
Pakistan	5.7	5.7	5.3
Total	377.0	377.4	379.8
Total Free World			
Foreign	7,220.3	7,248.3	6,501.8
United States	7,155.0	7,013.0	6,394.0
Total Free World	14,375.3	14,261.3	12,895.8
Communist Countries in Soviet Orbit:			
Russian zone of Austria*			57.5
Romania	150.0	150.0	125.0
Russia	1,400.0	1,400.0	1,210.0
Others	50.0	50.0	36.8
Total	1,600.0	1,600.0	1,429.3
World total	15,975.3	15,861.3	14,325.1

*Austria took over its producing fields from Russia in August 1955. †Includes an estimated 4,000 bbl. daily from Naft-i-Shah field not operated by the consortium.

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these areas. Estimates also have been made for other countries, particularly in Southeast Asia, where completely current reports are lacking. Communist countries in the Soviet orbit include satellite countries in Europe and Red China.

D'Arcy Granted Four Libyan Concessions

AMONG the last tracts covered by agreements between the Libyan Government and oil companies were four concessions granted D'Arcy Exploration Co., Ltd. The grants include 8,977,143 acres in Tripolitania and northern Cyrenaica.

In the photograph above, D. R. Macpherson of D'Arcy is congratulated by H. E. Salam al Qadi, Libyan Minister of National Economics, while Anis al Qassim, chairman of the government's petroleum commission, looks on.

The British Petroleum Co. subsidiary was granted one concession extending south and southwest from the coast near Tripoli and three others in the Northern Cyrenaica area. One of these three is east of Bengasi and north along the Mediterranean coast, another is east of Bengasi, and the third is south and east of Bengasi.

A dozen companies, including D'Arcy, have been granted a total of 126,745,251 acres in 47 separate concessions in Libya since last October when conferences between applying companies were called to work out overlapping concessions.

Mecom Extends Operations to Honduras

JOHN W. MECOM, Houston independent, announced plans last week for an extensive exploration program in Honduras.

Mecom and another Houston oil man, Ernest Cockrell, Jr., have acquired an interest in an oil concession covering about 50,000,000 acres along the northern coast of the Central American country. The concession extends across the entire northern coast line. It consists of about 14,000,000 acres on land and the remainder offshore.

The property was acquired from Cia. Petroleria Hondurena, S. A., which is retaining 15 per cent of the acreage. Associated in C.P.H. are a number of Honduras businessmen and a group of Texans headed by David C. McCord, Dallas. The estate of the late John Sullivan, San Antonio, also has an interest in the Honduras firm.

A test to secure the original concession was spudded by the Central American firm in the Mosquito area late in January. Projected to 4,500 ft., the wildcat is now below 1,795 ft. Mecom said he will move in additional rigs capable of drilling deeper.

Colombia program starts . . . Announcement of the Honduras venture comes shortly after Mecom signed a $20,000,000 exploration and exploitation concession deal in Colombia.

Mecom's technical personnel have already started work in oil fields between Morrosquillo Gulf and Tolu Bay.

The Houston oil man holds 75 per cent interest in the concession and the government firm, Empresa Colombiana de Petroles, 25 per cent. Exploration of the offshore acreage is to begin within 3 months.

Mecom also holds half interest in a concession in Haiti *(The Oil and Gas Journal, January 23, page 42).*

Mexican Refinery Dedicated

President Adolpho Ruiz Cortines of Mexico and Antonio J. Bermudez, director general of Petroleos Mexicanos recently joined in dedicating the expanded Minititlan refinery in Veracruz. Capacity of the plant has been doubled.

The $18-million expansion project added a new 15,000-bbl. cat cracker and 26,000 bbl. daily to the refinery's crude capacity. This is expected to save Mexico $40 million yearly in gasoline imports *(The Oil and Gas Journal, February 6, page 76).*

The 50,000-bbl. daily output of the expanded plant will cross the Isthmus of Tehuantepec by pipeline, then be transported by tanker to the West Coast areas formerly served by product imports from the United States.

Turbodrill Studied

Dresser reported dealing for Russian tool rights

AN official of Dresser Industries of Dallas is reported in Moscow negotiating for manufacturing rights on the widely discussed turbodrill.

J. B. O'Connor, executive vice president of Dresser, was reported by the New York Times last week to be dealing with the Russians.

O'Connor was quoted as saying the tool would revolutionize oil-well drilling in some areas of the United States. He was said to have inspected the turbodrill in the field near Ufa, Bashkir Republic.

While it remains in the experimental stage in the United States, the Russians claim to have the turbodrill in general use. They give it credit for making possible their increased production in recent years. The Soviets say it can make hole 10 times as fast as rotaries in some cases *(The Oil and Gas Journal, November 7, 1955, page 97).*

The idea of the turbodrill is not new. It's a mud-powered cylindrical turbine on the end of a string of drill pipe. Mud is pumped down the pipe through the vanes of the turbine to turn the shaft driving a conventional rotary bit *(The Oil and Gas Journal, November 7, 1955, page 93).*

Some advantages listed for the turbodrill are:

. . . **Less drill-pipe torsion** because rotary power is imparted to the drilling bit without rotation of the drill pipe.

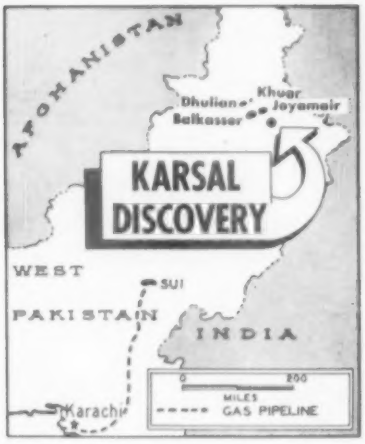
. . . **More power transmitted** to the bit.

. . . **Power is saved** through reduction of friction loss.

. . . **Increased drilling speed** in some cases.

. . . **Longer pipe life.**

. . . **Lower drilling cost** through less equipment depreciation.



Deep Well Testing

West Pakistan wildcat may set producing-depth record

INITIAL tests of a new deep wildcat in the Potwar basin of West Pakistan indicate the well may be a new field discovery at a much greater depth than any production so far in Pakistan.

Reports from Pakistan are incomplete but last week an Eocene limestone interval between 11,928 and 12,000 ft. was being tested after coring was encouraging. The well is the deepest ever drilled in this area of West Pakistan, which has the country's only oil production.

The well is about 18 miles from Chakwal in the Jhelum district of West Punjab. It was drilled near the village of Karsal by Attock Oil Co., Ltd., for Pakistan Oilfields, Ltd., in which Attock owns 70 per cent and the Pakistan Government 30 per cent.

Pakistan's output of about 5,700 bbl. daily comes from three of four small fields in the Potwar basin, Balkasser, Dhulian, and Joyamair. The three produce from depth ranging from 7,000 to 8,300 ft.

Turkey Lures Bolsa Chica

Bolsa Chica Oil Corp. has been awarded five petroleum exploration licenses covering 612,000 acres in southeastern Turkey.

Two of the licenses are in the Iskenderun area on the Mediterranean. The other three are in a block of 268,000 acres in the Siirt district on the northwesterly trend of Iraq fields and about 30 miles west of Garzan, one of Turkey's two producing fields.

Three Bolsa Chica geologists, headed by Hampton Smith, will study the areas for 8 months before the first well location is spotted.

Cuban Concessions May Be Sold

HELMERICH & PAYNE, INC., Tulsa, is negotiating to take over the Cuban oil exploration concession of Cia. Petrolera Perla Negra. The deal is expected to be completed early this week.

Perla Negra controls some 3,750,000 acres scattered from one end of the Caribbean island to the other in the provinces of Pinar del Rio, Oriente, Matanzas, and Havana.

The company is headed by William B. Duce, Los Angeles, president. Vice president is Lincoln Valentine, who was associated with Cuban-Venezuelan Oil Voting Trust, the largest landholder in Cuba.

This will be the first foreign venture for Helmerich & Payne, drilling contractors and producers with leases in Oklahoma, Kansas, Texas, North Dakota, South Dakota, Montana, Wyoming, and Illinois. W. H. Helmerich is president.

The company is expected to start active exploration soon if the deal is closed.

The agreement with Perla Negra gives the Cuban oil picture an added Oklahoma flavor. Two other Tulsa firms, Siboney Development & Exploration Co. and Russell Cobb, Jr., Inc., are operating there. The Jatibonico discovery which touched off the recent exploration play was made by a crew of Kerr-McGee Oil Industries, Inc., Oklahoma City. Kermac Contractors, Inc., a Kerr-McGee subsidiary, is engaged in development drilling in Jatibonico field, Camaguey Province.

American Independents Entering Italy

TWO American independents have entered a joint exploration and production venture for oil and gas in Italy with a large Italian industrial concern.

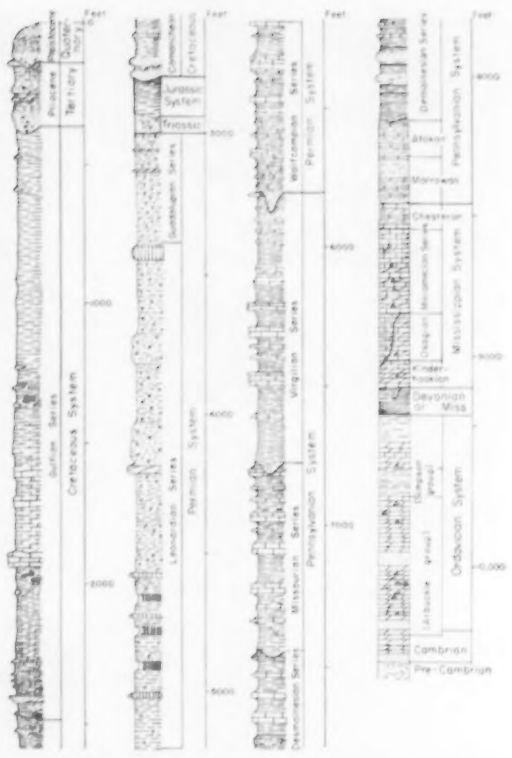
The oil men are Jack H. Heathman, Wichita, and A. A. Seeligson, Jr., San Antonio, of Heathman-Seeligson Drilling Co., Wichita. The two men are participating in the Italian venture through Molasse Erdol-Forderungs A.G. (MOFAG), formed in Switzerland last year. Heathman and Seeligson own MOFAG, but they represent other people as well as themselves in the venture.

MOFAG's associate in the program is Snia-Viscosa Corp., the leading rayon producer in Italy. The joint operation covers about 500,000 acres.

Shown signing the contract in Milan, Italy, is Dr. Marinotti, president of the Italian firm. Others left to right: Dr. Paul Gmur, attorney for MOFAG in Switzerland; Dr. Mario Braschi, MOFAG attorney in Italy; John F. Tolleson, formerly of Denver, now of Zurich, Switzerland, geologist and director of MOFAG; Heathman, MOFAG board chairman; and Prof. Luigi Manfredini, Snia-Viscosa vice president.

MOFAG operations in Europe will be handled by Edward A. Koester, Wichita, independent operator and 1954 president of the American Association of Petroleum Geologists, and James K. Ellis, San Antonio. They will reside in Rome.

DISCOVERY OF ARBUCKLE PRODUCTION at the Hartman 1 Rush puts an entirely new light on the oil possibilities of the Hugoton embayment. Fig. 1.



IN THE DEEPEST PART of the Hugoton embayment there are nearly 10,000 ft. of sediments. Fig. 2.

Hugoton Embayment Commands Fresh Look

New evaluation of future producing zones justified in light of important Kansas discovery

by Daniel F. Merriam

THE Hugoton embayment in Kansas took on a new aspect in regard to oil possibilities in October 1954, when oil was discovered in Arbuckle rocks by the W. L. Hartman 1 Rush, NW NW NE 10-19s-31w, Scott County, Kansas. As it marked the first Arbuckle production west of the Central Kansas uplift, the successful completion of this well ranked as one of the most important discoveries in Kansas during the year. The nearest proved Arbuckle production is in Rush County, about 75 miles east.

The Hartman 1 Rush was drilled to a total depth of 5,078 ft.; top of the Arbuckle was encountered at 5,043 ft. (—2,101 subsea). After the casing was perforated between 5,050 and 5,054 ft., the well swabbed 72 bbl. of oil in 12 hours on initial tests. The well was assigned a physical potential of 153 bbl. of oil per day from the Arbuckle and was designated as Grigston field by the Kansas Nomenclature Committee.

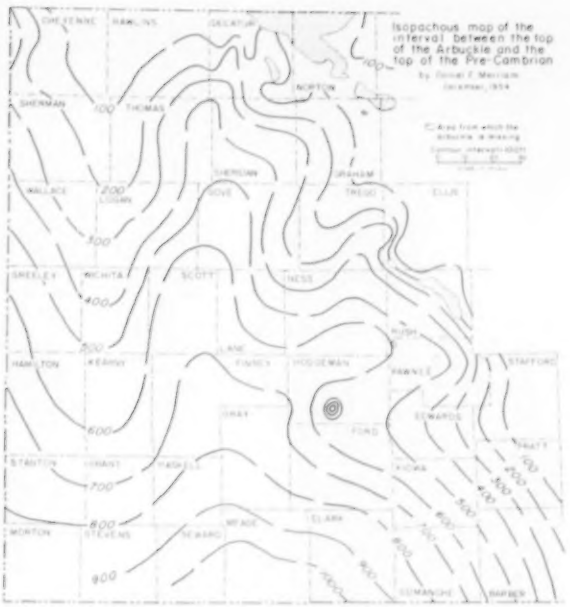
A completely new evaluation of the Hugoton embayment in respect to future producing zones seems to be justified in light of this new discovery, as well as the discovery of gas in Toronto (Pennsylvanian) rocks in Hugoton gas field, oil in Pennsylvanian (Morrowan) rocks in western Hamilton County, and production from Mississippian and Marmaton rocks in the southwestern part of the state. Previous to the opening of Grigston field in Scott County, most tests in the embayment were drilled only to the Mississippian. The amount of information concerning the lower Paleozoic section and the Arbuckle in particular is scant, because so few wells have been drilled to the Arbuckle, especially in southwestern Kansas where the embayment is the deepest.

Six isopachous maps were constructed to show in three dimensions the structural development of the embayment through successive intervals of time. The maps show the intervals between the tops of:

1. Pre-Cambrian and the Arbuckle group;
2. Arbuckle group and Viola limestone;
3. Viola limestone and Mississippian system;
4. Mississippian system and Lansing group;
5. Lansing group and Stone Corral formation;

The author is with the State Geological Survey of Kansas, Lawrence. This is a revised version of the original paper delivered at the fourth symposium on Subsurface Geology held at Norman, Okla., on March 1, 1955. The paper appeared in the proceedings of that symposium.

EXPLORATION



UPLIFT OCCURRED at end of Arbuckle time along the Central Kansas uplift and the Cambridge arch. Fig. 3.

Isopachous map of the interval between the top of the Viola and the top of the Arbuckle and the Pre-Mississippian areal geology

VIOLA SEDIMENTS covered most of the Hugoton embayment except in northwestern Kansas. Fig. 4.

6. Stone Corral formation and Dakota formation.

These tops were selected because: (1) they are easily recognized on electric and gamma-ray logs; (2) they are usually reported on sample logs, drillers logs, and scout tops; (3) they are believed to represent surfaces that formerly were essentially flat; and (4) they are widely distributed over the area covered by this investigation. The interpretations of the thickness maps are based on criteria set forth by Lee (1954).

Major structural features of western Kansas and surrounding areas are shown on Fig. 1. The map shows the relation of the different structural trends, although they are not necessarily of the same age nor were they developed at the same time.

The Hugoton embayment is a large synclinal structure which plunges southward into the Anadarko basin in Oklahoma. As shown by Maher and Collins (1949), the basin axis extends from Texas County, Oklahoma, through Stevens and Stanton counties, Kansas, into Prowers and Bent counties, Colorado. The width of the embayment is about 150 miles and the length more than 250 miles.

Paleozoic beds increase in thickness both toward the axis of the embayment and southward into the Anadarko basin. The deepest well in the Kansas part of the embayment is the Stanolind Oil & Gas Co. 1 Feathers, Section 15-35s-33w, in Seward County, which was drilled to a total depth of 8,243 ft. and ended in "crystallines." It is possible that in the deepest part of the embayment in Kansas the pre-Cambrian is overlain by about 9,500 ft. of younger rocks.

Structural Development

The scale and the contour interval of the maps are such that the erosional relief is minimized in comparison to the amount of structural relief. However, where the erosional relief is large and the structural relief is small, as along the southwestern flank of the Central Kansas uplift, the contours reflect this by their irregularity.

The structural pattern of the Hugoton embayment is recognized clearly from the isopacheous map that shows the interval from the top of the Arbuckle to the top of the pre-Cambrian (Fig. 3). A structural relief of approximately 900 ft. was developed in the

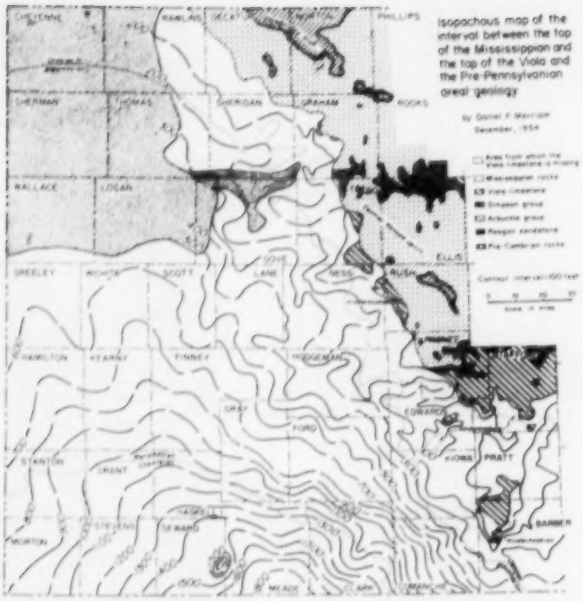
What Is the Hugoton Embayment?

The Hugoton embayment is a large synclinal shelf area of the Anadarko basin which extends into southwestern Kansas, southeastern Colorado, and the panhandles of Oklahoma and Texas. It is delineated on three sides by uplifts or positive areas (Fig. 1) which served to limit the extent of invading seas and as source areas for sediments.

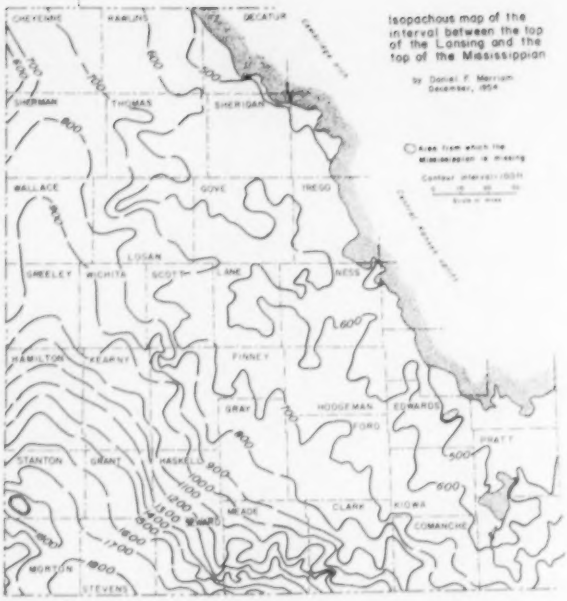
Initial downdip of the embayment probably occurred during pre-Cambrian time and the depositional history began with the invasion of the sea in late Cambrian time. The Paleozoic rock section is composed largely of marine sediments and the history of the basin is one of advance and withdrawal of the sea with intervening erosional periods. The extent of inundation and deposition in the embayment was controlled by marginal positive areas and conditions existing in the Anadarko basin.

The tectonic history of the embayment is a record of a series of epeirogenic movements. These movements, differential downwarping of the embayment and marginal areas, possibly accompanied by up-arching of the latter, persisted to the end of the Paleozoic era. Major structural development occurred at the conclusion of Arbuckle, Viola, Chesterian, Morrowan, and Permian times.

During late Pennsylvanian-early Permian time, the Oakley anticline began to develop structurally and eventually divided the embayment into the Syracuse and Cimarron basins. Later movements during Mesozoic and Tertiary time were the result of orogenies in regions to the west which only modified the structure of the embayment. The structural pattern was different and superposed on the area the northerly plunging Western Kansas basin.



AT THE END of Mississippian time, major structural changes took place and these Mississippian rocks were exposed to erosion on the crests of the large structures. Fig. 5.



NEARLY 1,900 FT. of sediments was deposited between end of Mississippian time and end of Lansing time in a trough that extended from southeastern Colorado into Oklahoma Panhandle. Fig. 6.

Kansas part of the embayment during that time. Perhaps the emplacement of the batholiths along previously formed lines of weakness in the area of the Central Kansas uplift and the Cambridge arch during pre-Cambrian time helped to initiate the beginning of differences in elevation of the up-arched and downwarped areas. The intrusion of these batholiths must have been accompanied by regional metamorphism that affected most of the pre-Cambrian sediments in the Hugoton embayment.

It is possible that these areas were topographically high and were a minor source area for the Reagan sandstone in late Cambrian time. The major source of the Reagan, however, seems to have been pre-Cambrian rocks of the older Siouxia uplift in northeastern Colorado and southwestern Nebraska, and the Sierra Grande uplift in southeastern Colorado. Thickness of the Reagan indicates that downwarping of the embayment was about 200 ft. at that time.

During the deposition of the Bonneterre formation and the Arbuckle group, clastic material ceased to be the major factor influencing the dominant rock type. However, the contribution of sand from the surrounding regions was still important. The Arbuckle was deposited more extensively than were the older sediments and buried the Cambridge arch and the Central Kansas uplift. The Siouxia and Sierra Grande uplifts which were connected by a low arch were separated at this time by the deposition of Arbuckle and Manitou sediments in central Colorado (McCoy, 1953, page 1878). At the end of Arbuckle time uplift occurred in the area of the Central Kansas uplift and the Cambridge arch (Koester, 1935, page 1425; Merriam and Atkinson, 1955). Erosion was extensive and where the Arbuckle sediments were not completely removed, as on the crest of the Cambridge arch, they were deeply weathered.

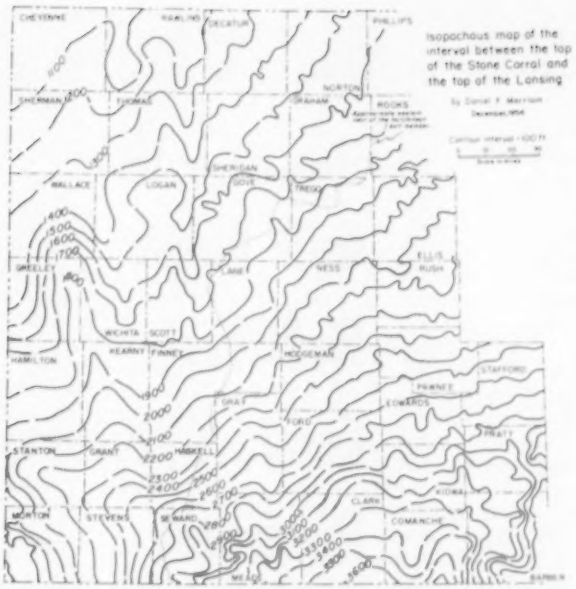
Structural pattern during Viola time . . . The pattern of deformation between the top of the Arbuckle and the top of the Viola reflects the earlier Paleozoic movements but to a lesser degree. The amount of structural relief developed during this interval amounts only to about 300 ft. (Fig. 4), and the differential uplift and downwarp that occurred at the end of the Arbuckle time restricted the deposition of the Simpson, Viola, and Maquoketa to the central parts of the embayment.

After the center of the shallow basin filled with Simpson sediments, the Viola overstepped onto older rocks on the margins of the embayment. Some clastic material must have been derived from the Cambridge arch, Siouxia uplift, and Sierra Grande uplift which still remained topographically high during the late Ordovician time. Pre-Cambrian rocks were still exposed on the positive areas in Nebraska and Colorado and on the Cambridge arch, but were buried under the Arbuckle group on the Central Kansas uplift.

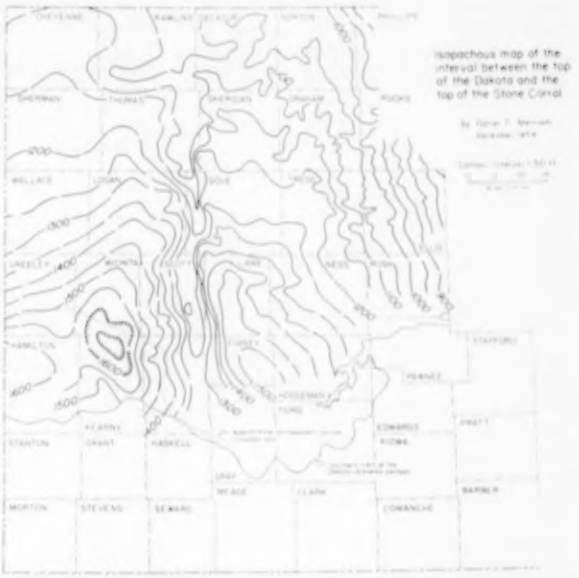
It is possible that both the Simpson and Viola extended across the uplift into eastern Kansas but were subsequently eroded before the deposition of Mississippian sediments. Distribution of the Maquoketa beds indicates that some structural movement occurred in Pratt County and northwestern Barber County, on the Pratt anticline which separates the Hugoton embayment from the Sedgwick basin (Fig. 4). This anticline has a northeast-southwest trend and plunges southwest.

Mississippian structural pattern . . . The structural deformation during Mississippian time reflected the same pattern as was developed during the early Paleozoic (Fig. 5). About 1,800 ft. of sediments accumulated in southern Kansas in the vicinity of Meade County (Fig. 5). The first sediments deposited were the "Kinderhook shale" (Chattanooga or Boice equivalent) that were laid down on the eroded surface of the Viola and older formations. This deposition of the "Kinderhook shale" presumably represents a rejuvenation of downwarping in the embayment after a long period of stability. Erosion that followed left only local patches of shale.

The embayment was again flooded as indicated by the deposition of Kinderhookian sediments. The Siouxia and Sierra Grande elements were still positive and supposedly supplied sediments, but the Central Kansas uplift and possibly the Cambridge arch were submerged. As the embayment filled with sediments of Kinderhookian, Osagian, and Meramecian age, the Mississippian deposits overlapped onto the surrounding positive areas.



DEPOSITION during late Pennsylvanian and early Permian time marked the end of development of the Hugoton embayment. Fig. 7.



AT THE END of Permian time, marine sedimentation ceased and depositional environment changed to one of continental sedimentation and subaerial erosion. Fig. 8.

In Central Colorado two arms of the sea coalesced and Mississippian was deposited on a high area that connected the Siouxia and Sierra Grande uplifts. The Sierra Grande was finally covered in Meramecian time (Maher, 1953, p. 2483). In Chesterian time the sea partly withdrew from the area so that the distribution of the sediments was restricted to the southern part of the embayment (Maher, 1953, p. 2483).

During the Mississippian period the Siouxia uplift was the southwestern extension of a large positive area that was connected to the Canadian shield (Reed, 1948). This transcontinental arch (Eardley, 1949) is believed to have been a major source of sediments during Chesterian time and possibly earlier for a large part of the Mid-Continent region.

The Pratt anticline which separated the Hugoton embayment from the Sedgwick basin continued to develop. Mississippian rocks that once covered the anticline were eroded from the crest of the structure exposing the Viola.

Major changes occurred at the end of Mississippian time. Downwarping of the eastern side of the Hugoton embayment was accompanied by uplift of the Central Kansas uplift and the Cambridge arch. Mississippian rocks were eroded from the crests of the arches and the surface was extensively beveled. On the western side of the embayment along the flank of the Sierra Grande uplift no major movement occurred (Maher, 1953, p. 2483). However, the Mississippian was beveled on the crests of the positive elements. The residual chert at the top of the Mississippian sequence was formed by the weathering of the limestones. The pre-Pennsylvanian areal geology resulting from this prolonged denudation of the embayment is shown in Fig. 5.

Lower Pennsylvanian structural pattern . . . The Hugoton embayment continued to be downwarped during the deposition of the lower Pennsylvanian sediments. The axis of the basin shifted southwestward and a trough-like depression with a northwest-southeast trend formed in extreme southwestern Kansas, southeastern Colorado, and the panhandle of Oklahoma (Fig. 6). In this trough more than 1,900 ft. of sediments accumulated between the end of Mississippian time and the end of Lansing time. Sediments were supplied to the Morrowan sea from the area of the Central Kansas uplift, the Cambridge arch, the Sierra Grande uplift, and the Siouxia uplift. Maher (1953) has demonstrated that the source areas in Colorado were low until the end of Morrowan time when uplift accompanied by faulting elevated the Sierra Grande uplift, the Wet Mountains, and the Front Range. These areas provided coarse sediments during the rest of the Pennsylvanian period. The clastic sediments interfingered to the east with normal marine and nonmarine shelf sediments in Kansas.

The distribution of Atokan sediments is more restricted than that of the Morrowan, and the Desmoinesian sediments extend over both so that middle Pennsylvanian sediments overlie the Mississippian on the edges of the embayment. The end of Atokan time was marked by a withdrawal of the sea and erosion took place before the readvance of the sea in Desmoinesian time. By the end of the Desmoinesian time the basin was largely filled and Missourian sediments completed the filling, and extended across the Cambridge arch and the Central Kansas uplift. By this time Pennsylvanian sediments had also buried a large proportion of the Siouxia and Sierra Grande uplifts so that only a small area of pre-Cambrian rocks was yet exposed.

The northeast-plunging Las Animas arch shows first sign of movement during the Missourian. The arch interrupted the narrow deep trough that had persisted in Morrowan, Atokan, and Desmoinesian time and changed the structural pattern of the northwestern side of the embayment. The Pratt anticline also shows movement during the Lansing-Mississippian interval.

By the end of Lansing time the source areas that had existed since pre-Cambrian time were mostly covered. In the extreme southeastern part of Colorado a small area of the Sierra Grande uplift was still exposed and a small part of the Siouxia uplift was exposed in West Central Nebraska. These areas were low and supplied only minor amounts of detrital material to the Pennsylvanian sea. The advance and withdrawal of the sea, caused either by raising and lowering of sea level or by oscillating movement of the land, formed the repetitious cyclic deposits.

Late Pennsylvanian-early Permian structural pattern . . . Conditions during late Pennsylvanian and early Permian time remained about the same as in the Missourian. After the retreat and advance of the sea at the end of Missourian time, sedimentation became more widespread and finally buried the Sierra Grande and Siouxia uplifts. The embayment continued to be downwarped, and in southern Clark and Comanche counties more than 3,600 ft. of sediments accumulated (Fig. 1). The different structural pattern which began to develop during this time interval eventually marked the end of the development of the Hugoton embayment which had persisted from the pre-Cambrian.

In the northern part of the embayment Rawlins, eastern Thomas, eastern Logan, western Gove, and eastern Scott counties, movement commenced along the Oakley anticline. This anticline is a north-south trending, southerly-plunging structure which divided the Hugoton embayment into the Syracuse syncline on the west and the Cimarron syncline on the east. The Oakley anticline must have been active in pre-Hutchinson time because it controlled the depositional western limit of the Hutchinson salt member of the Wellington formation.

The eastern limit of the embayment no longer existed as movement had ceased on the Cambridge arch and on the Central Kansas uplift. As a matter of fact, the center of the salt depositional basin seems to be in the area of the Central Kansas uplift. The Pratt anticline, likewise, showed no movement during this time.

Although there was structural accentuation of the Las Animas arch (Maher, 1945, p. 1665) at this time, the pre-Cambrian positive areas, Sierra Grande and Siouxia, were buried and were no longer controlling factors on the southwestern and northwestern sides of the embayment.

Stratigraphic intervals are fairly constant except for regional divergence to the south. This suggests gradual tilting southward but little or no structural movement during this time. However, some minor structures possibly were formed by differential compaction.

Pattern of deformation between top of the Dakota and top of Stone Corral . . . The structural pattern during this interval is an accentuation of the pattern that began to develop in late Pennsylvanian and early Permiantime (Fig. 8). The Oakley anticline had its major development at this time. It was extended southward in length and attained a structural relief of more than 300 ft. Downwarped basins were accentuated on both sides of the anticline separating the Syracuse syncline in Kearny and Wichita counties to the west and the Cimarron syncline in Lane and Finney counties to the east. No movement occurred on the Cambridge arch or on the Central Kansas uplift.

ACTIVE HUGOTON EMBAYMENT OPERATIONS

Southern Kansas	**36**
Wildcats	**6**
Field wells	**30**
Oklahoma Panhandle	**32**
Wildcats	**12**
Field wells	**20**
Southeast Colorado (Wildcats)	**2**
Northeast New Mexico (Wildcats)	**3**
Texas Panhandle	**51**
Wildcats	**25**
Field wells	**26**

Other detailed work suggests that it is possible that most of the structural development of the Oakley anticline, the Syracuse syncline, and the Cimarron syncline took place before the end of Permian time. The sediments which thicken southward into the Anadarko basin were extensively beveled at the end of Permian time; thus the outcrop pattern of the Permian formations roughly outlines the configuration of the embayment (Merriam, 1955, p. 37).

The close of the Permian period brought about a complete change in structural development pattern and geological conditions. Marine sedimentation ceased and subaerial erosion was accompanied by continental sedimentation.

References

Eardley, A. J. (1949) Paleotectonic and Paleogeologic maps of central and western North America: A.A.P.G. Bull., vol. 33.

Koester, Edward A. (1935) Geology of Central Kansas uplift: A.A.P.G. Bull., vol. 19, No. 10, pp. 1405-1426.

Lee, Wallace (1954) Thickness maps as criteria of regional structural movement: Kansas Geol. Survey, Bull. 109, pt. 5.

McCoy, Alex W. III (1953) Tectonic history of Denver basin: A.A.P.G. Bull., vol. 37, No. 8, pp. 1873-1893.

Maher, John C. (1945) Structural development of Las Animas arch, Lincoln, Cheyenne, and Kiowa Counties, Colorado: A.A.P.G. Bull., vol. 29, No. 11, pp. 1663-1667.

—— (1953) Paleozoic history of southeastern Colorado: A.A.P.G. Bull., vol. 37, No. 11, pp. 2475-2489.

Maher, John C., and Collins, Jack B. (1949) Pre-Pennsylvanian geology of southwestern Kansas, southeastern Colorado, and the Oklahoma panhandle: USGS, Oil and Gas Investi., Prelim. Map 101, sheets 1-4.

Merriam, Daniel F., and Atkinson, William R. (1955) Tectonic history of the Cambridge arch in Kansas: Kansas Geol. Survey, Oil and Gas Investi. No. 13, Maps and Cross Secs.

Reed, E. C. (1948) The possibility of a land bridge across Nebraska in Mississippian time: Jour. Geology, vol. 56, No. 4, pp. 308-312.

Here's how . . .

Gulf Coast Refiners Conduct Training Programs

DO Gulf Coast refiners emphasize training programs in their operations? If so, how are they carried out? How important are they considered to be? Recently, Larry Resen, of the Journal's Houston office, visited refiners in this area to find out the answers to these and other questions.

Here, in question-and-answer form, is a report on the results of those visits. Immediately following each question, Larry summarizes the answers he received and points out current trends.

Q. Do you have a training program for assistant operators, foremen, young engineers?

A. Over-all, there is a strong trend toward these training programs. Some plants are far ahead of others, having elaborate and detailed programs in all three categories. However, those which are deficient are catching up fast.

The point which is most clear, though, is that all of the refiners feel the need for the programs, and although the realization is often in indirect manner, the companies are spending a considerable amount of time and money in educational programs.

Q. How long do these training programs last?

A. There is a great variety of programs, each with its own type of schedule. For instance, engineering trainees have continuing programs which last 1-2 years, depending on both the company and individual trainee. Operating foreman and supervisor programs last about 6 months. Again, the time put in varies; with some companies there may be just one monthly session—although

"On older units there is a never-ending on-the-job program for operators."

a long one—and others will have a weekly session.

In the case of new units being built, normally there are intensive sessions. Sometimes they are run full time for several weeks prior to the unit's being put on stream. Part of the training will be in skull sessions, and the remainder will be at the unit in familiarization work.

On older units, there is a never-ending on-the-job program for operators. As a man starts on a unit—say as third-class operator — he immediately starts training to take over the job just above his. Meanwhile, the second-class operator is training to take over the first-class job. Thus, as promotions, expansion, and attrition take place, there'll be an immediate supply of trained personnel to fill the gaps.

Most of the craft programs have an apprentice-training setup, with the junior men guided by the experienced craftsmen. While most of this is on-the-job type of training, there are some programs set up on a formal basis over a period of 36-48 months. One refiner ties in a rating system with the progress a man makes over each 6-month period. Thus, he has a guide which indicates which features of his craft he must have mastered at the 6-month, 12-month, 18-month period. If he passes a test at these periods, he passes into the higher-pay grade. If he fails, he gets another chance to master the work. Naturally, if a man fails to get into the higher grade over a long period of time, he should be shifted out of that particular craft into something more suitable for his talents.

Q. Are notes for the course mimeographed or otherwise prepared?

A. There are some detailed manuals at most of the plants for the operators. First, these usually describe basic chemistry as related to petroleum refining, and then gradually pass through process descriptions into the more detailed explanations of equipment and how it operates. Some of this material appears in the Journal's "Foreman's Pages" each week. It is selected from various company manuals and published by permission.

There are some manuals which outline the procedure to be followed when performing a specific maintenance job. For instance, one manual specifies how many and what size cranes to use in a crude unit turnaround . . . What equipment will be needed for rigging up to overhaul a tower . . . What spare parts should be at the job, in the shop, etc. . . . How many hours it normally takes to pull all the bundles on the unit, and so on.

While these manuals are not limited to training programs, they do save a lot of time and expense in streamlining maintenance work, especially as experience is gained on the units over a period of years.

In addition to manuals, and films put out by some equipment people, some plants use simple, miniature installations for training purposes . . . Thus, a layout in a corner of a shop building or in a classroom, might include a drum, liquid-level controller, assorted valve and piping arrangements, a flow recorder-controller, a pressure regulator, check valve, swage, manometer, several pumps, etc. The men can actually make adjustments on this equipment and see the results, as well as get the feel of the equipment.

Q. Who are the instructors?

A. In most cases, it's the immediate supervisor or department head who carries out the instruction. Thus, the head of technical services might take the engineers in tow; unit foreman teach the operators; master mechanic teach the apprentices, etc. There are a few programs where a man will be pulled off his job for a specified period of time, attend an outside school or business course, and then return to teach this to people at the plant.

Outside instructors are also used, especially in fields such as industrial relations. In addition, the plants take advantage of schools which equipment manufacturers have at their respective factories. Thus, an instrument man might go to Foxboro and Minneapolis-Honeywell schools to learn instruments, and a compressor man might go to Clark Brothers' training schools.

One company sends its new supervisors to a 5-day course held at Southern Methodist University which is a basic course on being a supervisor. It is part of a management department long course on "Human Relations for Foreman and Supervisors" held at the university. By getting this instruction completely apart from the plant, the new supervisors are thus assured of an unbiased introduction to their new position by an outsider.

Q. How many employes are necessary to run a plant, and how are these broken down by operating, engineering-technical, and mechanical categories?

A. This was a difficult question to correlate. Since research facilities vary considerably, the people involved in these positions were excluded so that all references would be limited to the individuals engaged in running the plant. Also, processing arrangements vary considerably. For instance, one plant might operate a sulfur-recovery unit; another might pipe the gas to a separate or associated company. One might have lube operations, and a second none. One might be engaged in limited petrochemical operations, and aonther have all of these operations handled by a separate company. The personnel numbers should be considered in the light of these and other qualifications.

Total manpower varied from a high of 19.7 per thousand barrels of throughput to a low of 8. This includes everyone in the plant, from office manager to gardener. The low figure was for a plant in the medium-sized category. Limiting the figures to plants in the +100,00-bbl. throughput, the low figure is 10.4.

The low plant did not have lube-oil or other specialty operations carried on by those in the high range. The unweighted average: 14.6. The average, throwing out the low: 16.2.

Operating manpower varied from a low of 28.1 per cent of the work force to a high of 42.7 per cent of the work force. The low figure was in a large plant, and the high one was in a medium-sized plant. This bears out the thinking being followed in building large-size units which operate more efficiently from a manpower standpoint; i.e. it takes as many operators to handle a 25,000 as it does a 100,000-bbl. still. The average: 33.5. The average throwing out the high: 31.5.

Technical manpower—chemical engineers, chemists, other types of engineers—varied from a low of 6 per cent of the work force to a high of 12 per cent. The high is in a plant having many specialists on hand. The average: 8.0. The average throwing out the high: 7.0.

Maintenance . . . This is generally referred to as the mechanical department. Here was where the greatest unanimity was found in the figures. The low was 38.6 per cent of the work force; the high of 52 per cent of the work force was generally in line with most of the plants. The average came out to 46.8; omitting the low, average was 49.1.

It's cheaper to move dirt from backfill to ditch, which is what this machine is made to do . . .

New Machine Cuts Cost of Padding Pipeline

TO cut the cost of padding the ditch during pipeline construction in rocky country, a special machine has been developed by M. J. Crose Manufacturing Co. This machine moves dirt for padding from the backfill of the spoil bank to the ditch—so that the coated pipe is protected against damage from rocks when final backfilling is done.

This machine was designed to hit the problem directly, simply, and economically. For moving dirt from the backfill is much cheaper than hauling it from a distance in rock country. It has been estimated that the machine operation is 66 to 77 per cent cheaper than protection of the coating by means of a hard, pliable, sheet shield, which is sometimes used as a substitute for hauling dirt for padding.

To help keep down contractor's cost, pipeline companies usually give contractors the option of either hauling in dirt or protecting with a sheet shield in rock country. But most pipeline companies prefer to have the pipe protected by dirt padding rather than by the sheet shield. Such preference has been influenced by recent emphasis on the importance of avoiding denting, nicking, or scratching of the pipe. Scars on the pipe are now recognized as points from which splitting may start under high pressure during pipeline operation.

The thicker cushion provided by dirt padding is regarded as more effective for armoring the pipe against the blows of a rock barrage during backfilling. Therefore, the protection of pipe from falling rocks is twofold: (1) Prevention of damage to the pipe coating results in better protection for the pipe against corrosion and lower cost of cathodic protection during the life of the line; (2) prevention of nicks and scratches is a safeguard against propagation of splits in the pipe while under stress during operation.

How it works . . . The padding machine picks up the dirt from the backfill in the spoil bank by means of a rotating head at the end of an auger-type conveyor. This delivers the dirt into the ditch at places where it is needed alongside the pipe and over it. The head and conveyor are supported in a boom with two legs. The whole unit is attached to a large tractor.

The tractor driver operates the padding machine. On the boom is mounted a 35-hp. gasoline engine. The auger conveyor tube for padding 16-in. pipe would be 12 in. in diameter; for 30-in. pipe the tube would be 16 in. in diamter.

The tractor is not permanently tied up for the job. For the padding machine has been designed so that it is readily detachable. A padding unit for 16-in. pipe would weigh 3,000 lb., for 30-in. pipe 5,000 lb.

Essentially, the padding machine functions to screen the dirt. The rotating head sorts or sifts but does not grind or pulverize. Nothing larger than 2-in. diameter material is picked up by the rotating head and put in the auger conveyor. The larger rocks and clods of dirt are left behind. These are later pushed into the ditch by backfiller or dozer.

An important feature of the padding machine is the hydraulic piston control manipulated by the tractor operator. This quick easy means of flexible control makes it possible to clear small obstructions without manipulating the winch to raise and lower the boom. With this hydraulic control, the head "nuzzles" along over the rocks in the backfill in the spoil bank.

Speed . . . Progress has been made at the rate of 3,000 to 4,000 ft. per day on the 93-mile, 26-in. job for Cities Service Gas Co. from Blackwell, Okla., to Independence, Kans., contracted by R. H. Fulton & Co. On an average, an output of at least 2,500 to 3,000 lineal feet per day can be expected for all pipe diameters. Dirt handling amounts to 1 cu. yd. for each lineal yard (3 ft.) of pipe for 30-in. pipe.

Cost comparisons indicate that for padding 26 and 30-in. pipe, the work of padding by the machine would cost

PIPELINING

. . . spilling a thick, soft padding on top of pipe as it travels along the route of line . . .

Trenches

by Paul Reed
Pipeline Editor

. . . leaving behind large rocks which would damage pipe . . .

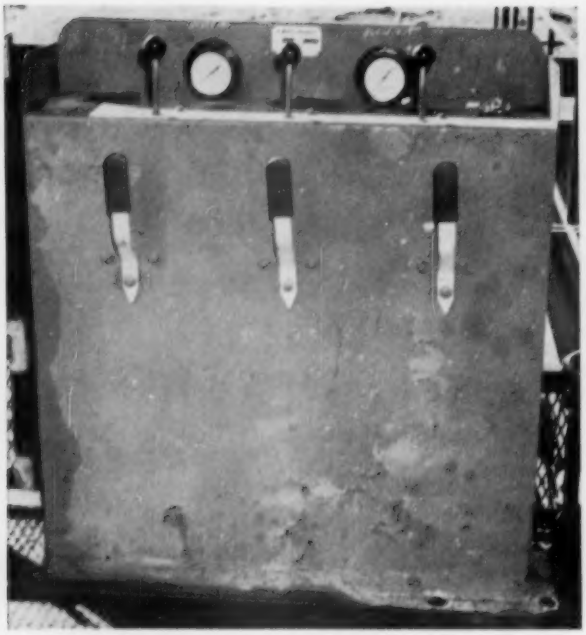
. . . and which will be put in ditch by backfilling machine.

about 20 cents per lineal foot. For pipe of this diameter, protection by a sheet shield would be roughly 60 to 70 cents per foot.

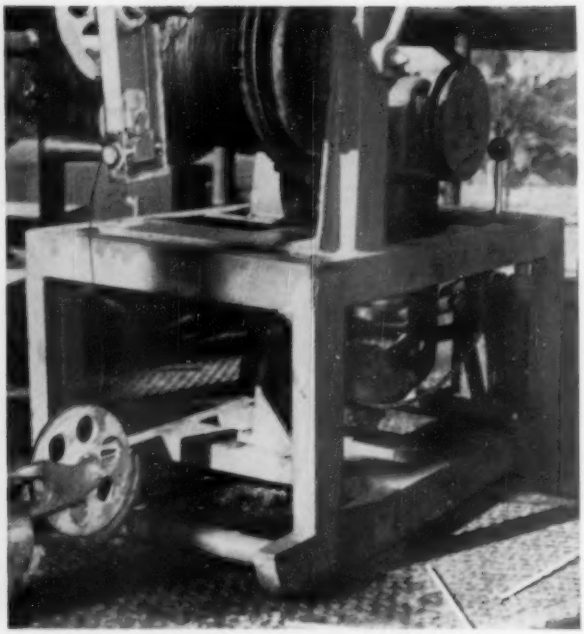
Material on such jobs has been estimated as 34 cents and labor as 30 cents per foot. Savings from the padding machine of $3,800 per day would amount to 66 to 70 per cent. For padding 100 miles of rocky ditch, saving to the contractor would be $380,000. For 500 miles it would be $1,900,000.

Adding cement . . . With the addition of a small hopper next to the screening or cutter head, portland cement may be introduced into the auger section. The auger would mix the cement with dirt taken from the backfill and deposit a stabilized soil plug on top of the pipelines. This method would be far cheaper and better than present methods of using dirt-filled sack "breakies" in country subject to erosion of the ditch line. This same method may be used to stabilize the backfill in areas subject to flooding.

The new padding machine promises to bring significant improvements to pipeline construction. Operation of the machine would cut contractors' costs and give the pipeline companies better protection for the pipe. It promises to be an outstanding contribution.



CONTROL PANEL provides quick, easy operation of hydraulic units from drillers position. Bottom levers are blowout-preventer controls. Top levers operate the auxiliary units such as . . .



. . . WIRELINE REEL which obtains power fluid directly from the pump. Other units shut down automatically when reel is operating. Lever at reel allows forward or reverse drive . . .

Fluid Motors Are Small, But Pack a

by J. O. Scott
District Editor

FLUID motors are filling the need for rugged compact power packages to drive the auxiliary units on a drilling rig. Reasons why these motors are useful are:

- They provide power at any time the rig engines are operating without requiring the light plant to be operated.
- Units are easily interchangeable. They operate either as power pumps or driving motors. Motors have a wide power range so that one standard size may be used for all needs.
- Motors are small. A typical 20-hp. capacity hydraulic motor is only about 6 by 8 in. and weighs about 20 lb.
- Motors are spark-proof. Cost of the hydraulic motors is a lot less than spark-proof electric motors.
- They have high torque even when stalled. They are not harmed by overloading.
- The motors may be turned in either direction for flexibility of operation.

What they are . . . One type of hydraulic pump/motor in use consists of three main components: (1) Port housings with connections for fluid entry and exit, (2) a support for the shaft bearings and shaft assembly, and (3) a pumping cartridge consisting of a precision-fit rotor, replaceable vanes, and cam ring.

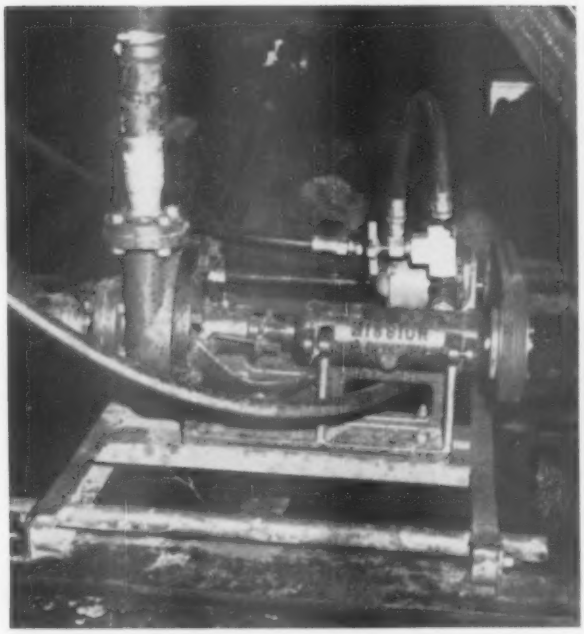
The main power unit or pump is driven by an external power source such as the rig engines. As the pump shaft is rotated, it turns the rotor in the pumping cartridge and pumps hydraulic fluid. The fluid leaves the pump through flexible hydraulic lines and is directed into the various motors in operation. When the hydraulic fluid passes through a motor, it turns the rotor and thus the shaft which drives the equipment.

High stalled torque . . . Because the pump is positive acting, it will develop high fluid pressure. In turn, the motors are positive acting and will convert practically all of the input fluid power back into mechanical power. If the motor is overloaded, the rotor will slow down or stop. This reduces the flow of fluid through the motor but increases the pressure drop and the torque. In the usual installation, only a limited torque and pressure will develop because the lines automatically unload at a set pressure. Thus no harm to the motor occurs. Typical performance of one size of unit is shown in Figs. 1 and 2.

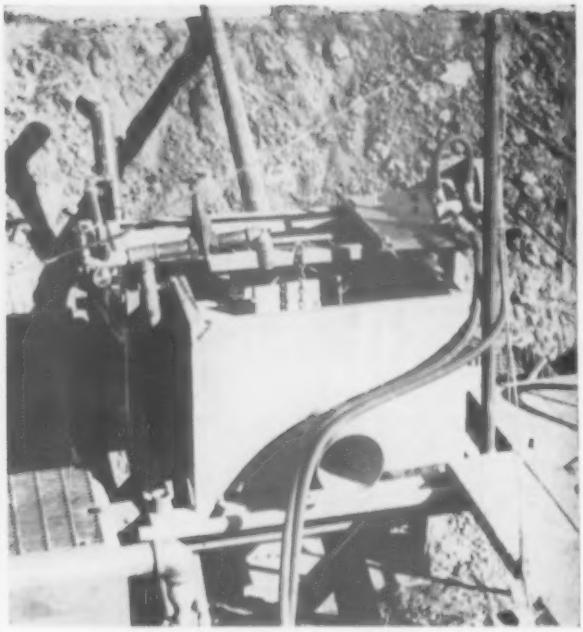
Uses on rig . . . Primary uses of the fluid motors are to drive the shale shaker, the water pump, and the wireline reel. Other uses include power for a mud mixer or any other application where a lightweight powerful motor is needed. The fluid pump provides the power for these motors and also maintains fluid pressure on the blowout-preventer accumulators.

Examples of the uses of the fluid motors on a drilling rig may be seen in the accompanying photographs of equipment on Rig 33 of Big Chief Drilling Co., Oklahoma City. This rig is currently operating in the West Short Junction field of central Oklahoma. Fig. 3 is a diagram of the system used on Big Chief's rig.

Operation . . . Big Chief uses a Denison TME5 hydraulic pump and three Denison TMC3 motors in its power system. Input power from the rig engine depends on the engine speed. At normal engine speeds for drilling,



. . . WATER PUMP which operates separately or simultaneously with shale shaker. Bypass valve allows operation of fluid motor over a range of speed . . .



. . . SHALE SHAKER which is the last unit in the power chain. A relief valve across shaker motor throttles excess fluid to drain line, holds motor speed nearly constant.

Punch in Driving Rig Auxiliaries

Here are six reasons for their growing popularity

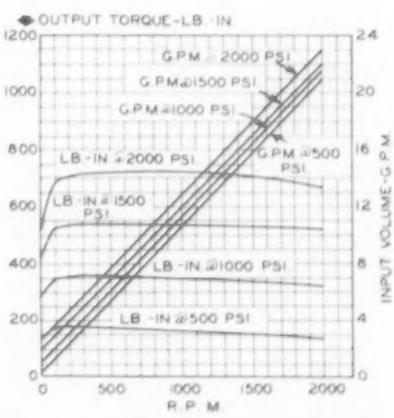
the pump will turn at 950 to 1,000 r.p.m. and will pump about 28 g.p.m. Output pressure up to a maximum of 2,000 psi. can be obtained. When the rig engine is idling, the pump will turn at about half this speed and will pump about half as much fluid. Input power at normal engine speed will range from about 2 hp. at zero fluid pressure to 38 hp. at 2,000 psi.

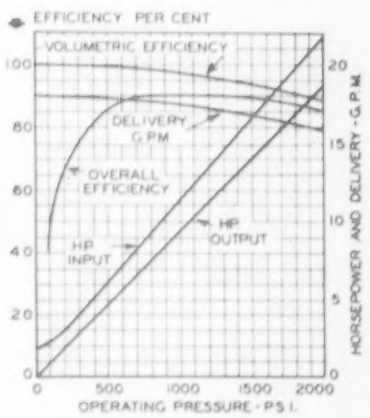
Motors are capable of producing up to 20 hp. if operated at 2,000 r.p.m. with a fluid pressure drop of 2,000 psi. This requires a fluid throughput of about 20 g.p.m. If the pressure drop is less or less fluid is passed, the power is reduced.

Blowout control also . . . In Big Chief's system, an output pressure of about 1,500 psi. is normal for the pump during drilling operations when both the shale shaker and water pump are operating. If only one unit is operating, the pressure is less, the amount depending on the power needed to drive the equipment.

However, the pressure maintained on the blowout-preventer accumulators is 2,000 psi. These different pressure requirements are met by means of an unloader valve between the accumulators and the fluid pump. During times of no demand, pressurized fluid is stored in the accumulator. However, when the pressure drops about 10 per cent, the valve automatically shuts off flow from the motors and diverts the pump output to the accumulators. As soon as the pressure builds back up in the accumulators, the valve diverts the fluid back to the motor system.

Normally, if the blowout preventers are not being operated, the time needed to build back the accumulator pressure is very short and there is practically





Figs. 1 and 2—Operating characteristics of typical hydraulic pump/motor as motor, left, and as pump, right. Note high stalled torque and speed range of motor. Pump, which provides fluid for motors, has high volumetric efficiency even through a wide output pressure range.

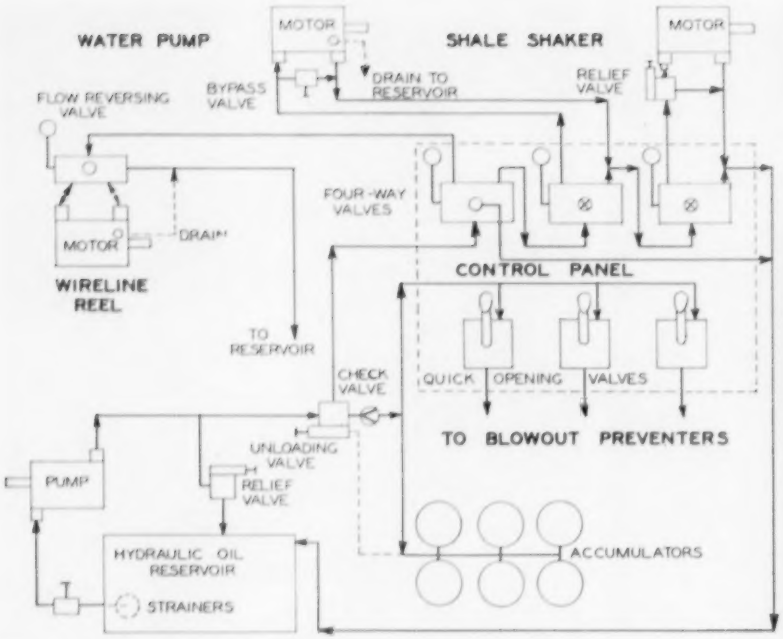
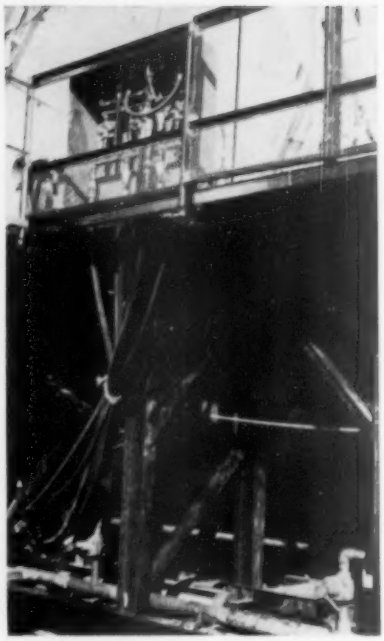


Fig. 3—Power hookup is by hydraulic hoses which pass from pump to control panel and then to the motors on each auxiliary unit. Hydraulic systems also maintains charge on blowout preventer accumulators.



HYDRAULIC LINES coming from control panel couple quickly for ease of moving and rigging up.

no interruption of fluid flow to the motors. Although during times of normal drilling unloading valve operation is infrequent, it does provide a positive automatic method of insuring rapid blowout-preventer operation should the need arise.

Fluid circuit . . . After the fluid leaves the unloader valve, it passes to the control manifold which is located on the rig floor close to the driller's position. At the manifold, a four-way valve provided for each piece of equipment, allows the equipment to be turned on or off. The panel also holds the valves for operating the blowout preventers.

On Big Chief's rig, the fluid goes first to the wire-line-reel valve. During normal drilling, this valve shuts off fluid from the reel and bypasses the fluid to the water-pump and shale-shaker valves. The valves and lines are series connected so that the fluid can flow first through the water-pump motor and then through the shale-shaker motor. Or, it can bypass the water pump and flow to the shale shaker or flow to the water pump and bypass the shaker.

Reel circuit . . . One feature of the wire-line-reel hookup is that the water pump and shale shaker are automatically shut off while the reel is being used. These are not normally needed during wireline operations, and shutting them off saves unnecessary wear and tear. The automatic feature makes it unnecessary for the driller to remember to shut off the unneeded equipment.

The reversible feature of the hydraulic motor makes it ideal for operating the wireline reel. Whenever the direction of flow of fluid is reversed through the motor, it will reverse its direction of rotation. Sometimes the driller may want to reel the line into the hole as well as out. To accomplish this he merely operates a valve on the reel chasis which reverses the direction of flow through the motor.

Speed control . . . When the motors are run at maximum rated speed, they may not take all the fluid put out by the pump. If the fluid pumped through is too great, the motors will run too fast which may cause the pumping cartridge to burn out. To remedy this situation, part of the fluid is bypassed around the motor by a valve hooked to the inlet and exit lines. This valve also allows operation of the motor at a range of speeds without changing the pump output. An example of this bypass may be seen in the accompanying photo of the water pump used by Big Chief.

On the shale shaker of Big Chief's rig a relief valve is attached across the motor hydraulic lines. This valve is set at a very low pressure so that it will bypass part of the input fluid and prevent excess motor speed. If input pressure increases such as when the water pump is shut off the valve bypasses more fluid and maintains nearly constant motor speed. The excess fluid that bypasses the motor returns to the hydraulic-fluid reservoir.

Installation . . . A hydraulic-motor power system is easy to install on practically any drilling rig. Because of its small size the power pump can usually be placed in a waste space near the drilling engines. Usually it is placed so that it may be belted onto the engine flywheel. The hydraulic-fluid reservoir should be placed near the pump but since the pump is positive-acting, gravity drainage is not necessary. For best operation, the reservoir should hold about three times the volume pumped each minute. This is to allow adequate cooling time for the fluid since it becomes heated by high-pressure motor operation.

Hydraulic lines may be kept in a bundle to make them easy to hook up or dismantle. Lines are tagged so that correct connections are easily made. Couplings are self-sealing and may be made up to be pressure-tight very quickly by hand or small wrench.

Maintenance of the hydraulic units is practically nil provided proper precautions are taken in dismantling and hooking up the lines. Since the clearances in the units are small, it is essential that dirt and foreign matter be kept out of the fluid. Although the fluid is continuously filtered while pumped, any extraneous dirt that gets into the lines when they are broken down may damage the motors. A simple precaution to prevent this is to cap each line as it is uncoupled.

ELECTRIC AND RADIOACTIVE LOGGING—4

How MicroLogs and Microlaterologs Work

by Robert V. West, Jr.

Here are the micro devices which permit the determination of permeable zones and the calculation of oil saturation. How these logs are used in quantitative analysis will be shown in next installment. Previous installments appeared January 30, February 6, and February 20.

A MICROLOG is a resistivity curve used specifically to locate permeable zones. In a limited way, the S.P. curve differentiates between permeable and nonpermeable zones. But, in the presence of saline mud, the S.P. curve becomes flattened and permeability identification becomes difficult.

In addition, where permeable zones are present in thick, dense formations, the S.P. curve does not exactly define the limits of the permeable zones. It was for this reason that the MicroLog was first used in limestone formations. But it has since become important in formations of laminated sand and shale for the exact determination of boundaries between successive zones.

The MicroLog device employs very short electrode spacings—usually 1 to 2 in. The electrodes are mounted in an insulated rubber pad which is pressed against the wall of the hole by a steel spring (Fig. 25). The electrodes are thus insulated from the mud column and measure only the average resistivity of the small volume of material under the pad (referred to as the microvolume).

At a permeable zone, a mud cake forms on the wall of the hole because of filtrate loss into the zone. When the MicroLog pad is applied to such a zone, the mud cake usually represents a large portion of the microvolume. The part of the microvolume not represented by mud cake consists of a portion of the solid structure of the permeable zone containing mud-filtrate. The mud-cake resistivity is low, normally no more than twice that of the mud. The resistivity of the solid structure filled with mud filtrate is higher than that of the mud cake and depends on the nature of the formation.

Microresistivities at permeable zones are usually quite low and generally not greater than 30 times the mud resistivity. This limit is arbitrarily set as the maximum.

Two spacings . . . A short electrode-spacing is more influenced by the mud cake than the long spacing because of the smaller depth of investigation. The difference between microresistivities recorded with long and short spacings is called "separation." It is termed positive when the long-spacing value is greater than the short-spacing value.

Zones with large positive separation are usually permeable. At impervious zones of low resistivity, essentially identical microresistivity values (that of the formation) are recorded with both spacings and there is no appreciable separation. At impervious zones of high resistivity, both microresistivity values are higher than the maximum limit stated above. Hence no permeability would be indicated for either impervious zone.

Fig. 25 shows the electrode arrangement for MicroLogging where A is the power electrode and M_1 and M_2 are measuring electrodes. The distances between AM_1 and M_1M_2 are each 1 in. A two-electrode combination of AM_1 or AM_2 is equivalent to a micronormal arrangement of 1 or 2-in. spacing respectively. A three-electrode combination of AM_1M_2 is equivalent to a microlateral arrangement with an AO spacing of 1.5 in. (O being the midpoint of M_1M_2). The practical configuration consists of the 2-in. micronormal AM_2 and the 1.5-in. microlateral AM_1M_2. On MicroLog headings, the latter is called the 1 by 1-in. microinverse.

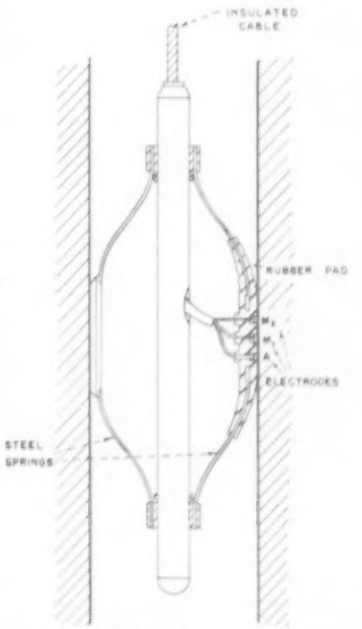


Fig. 25 — The MicroLog device has steel springs which press the electrodes against the wall of the hole. Electrodes produce micronormal and microlateral curves.

MicroLog interpretations are based on the following factors: (a) absolute values of the micronormal and microinverse resistivities; (b) separation between micronormal and microinverse curves; and (c) trend of the S.P. curve. The important combinations of these factors are summarized in the following rules of interpretation:

Case 1 . . . Micronormal and microinverse resistivities both greater than 30 times the mud resistivity. The formation is impervious regardless of separation.

Case 2 . . . Microinverse less than 30 times the mud resistivity. In this case, the sign and magnitude of the separation is important. For large positive separation (more than 20 per cent), the formation is permeable. For large negative separation (more than 20 per cent) the formation is probably impermeable. An exception would be a salt-water-bearing formation where very little mud-filtrate invasion occurred or filtrate migrated. Here the long curve may read a lower formation resistivity than mud-cake resistivity.

For this and for separation less than 20 per cent, the situation can be resolved by observing the trend of the S.P. curve. If its trend is to the left (negative), the bed is probably permeable. If its trend is to the right (positive), the bed is probably impermeable. An example of these interpretations is shown in Fig. 26.

Resistivity Curves: Microlaterolog

The Microlaterolog is a relatively new logging method which is used primarily to measure the resistivity of the formation close to the wall of the well bore where it has been invaded by mud filtrate. The accurate measurement of the resistivity of this invaded zone is of basic importance in the quantitative cal-

Author is president of Slick Secondary Recovery Corp., San Antonio.

culation of porosity and fluid saturation. So the Microlaterolog is used primarily as a quantitative tool, and its function in this way will be more completely explained in a later installment.

The invaded zone is not a homogeneous medium extending laterally from the well bore. But the fluid distribution—mud filtrate, connate water, and hydrocarbons—and the resistivity of the zone vary progressively with distance from the well bore. Hence, usual resistivity-measuring devices yield some average value which is a function of fluid distribution and of depth of investigation. Conversely, the zone within a short distance from the wall of the hole—say, 2 or 3 in.—has probably been thoroughly flushed by mud filtrate and the resistivity of this zone is essentially constant throughout. This is the zone whose resistivity is measured by the Microlaterolog device.

The MicroLog can also be used in estimating the resistivity of the invaded zone close to the well bore and in porosity determination provided the flushed-zone resistivity is not too high. However, in hard formations the results lack accuracy, and in any case interpretation charts are required to convert MicroLog resistivities to flushed-zone resistivities. The Microlaterolog device does not suffer from these disadvantages.

...The Microlaterolog device consists of one center electrode A_0 of small size and three circular electrodes M_1, M_2, and A_1. Each of three is concentric with A_0 and spaced with short gaps (about $\frac{3}{8}$ in.) between successive rings. These electrodes are imbedded in an insulating support and are applied against the wall of the bore hole by a spring system similar to that used with the MicroLog. Fig. 27 shows the Microlaterolog electrode arrangement.

A constant and known current is sent through the center electrode A_0 and another current through the outer-ring electrode A_1. The intensity of the latter current is automatically adjusted to maintain the difference in potential between rings M_1 and M_2 at essentially zero. The potential at either M_1 or M_2 is recorded and the resistivity measured by the device is proportional to this potential.

At a permeable zone, the electrode pad is separated from the formation by a mud cake. Since the Microlaterolog current crosses the mud cake in essentially a horizontal direction, the potential drop across the mud cake is small compared to that across the formation. Therefore, for practical purposes, the influence of the mud cake on the resistivity measured by the Microlaterolog is negligible up to mud-cake thicknesses of ½ in.

However, in the case of the nonfocused MicroLog, current lines tend to fan out from the power electrode A, and appreciable potential drops may occur across the mud cake. In some cases, the effect of the mud cake can become predominant, and the MicroLog then does not sharply reflect the true resistivity of the flushed zone. These effects are shown in Fig. 28.

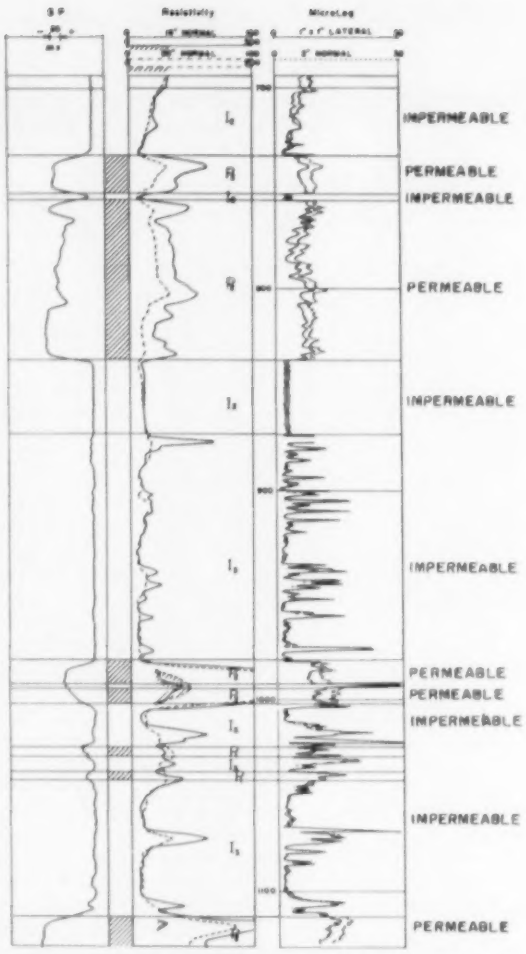
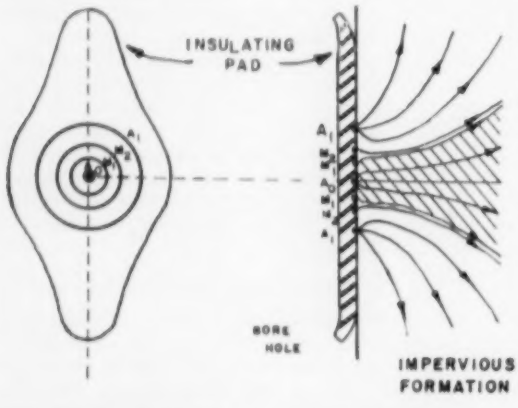


Fig. 26—Interpretation of permeable zones with the MicroLog. Positive curves, separation resistivities less than 30 times mud resistivity, leftward deflection of S.P. indicate permeability.

Since the current beam of the Microlaterolog has a very small diameter (i.e., about 2 in.) the resolving power of the device is very high. Thus the recorded curves give accurate, detailed definitions of boundaries.



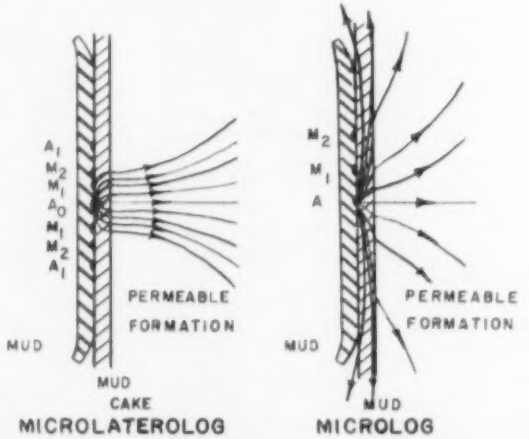


Fig. 27 (left)—With the Microlaterolog device, current emitting from center electrode A_0 forms a beam penetrating formation horizontally. Fig. 28 (right)—Comparison of the focused current of the microlaterolog to fanned-out current of the MicroLog.

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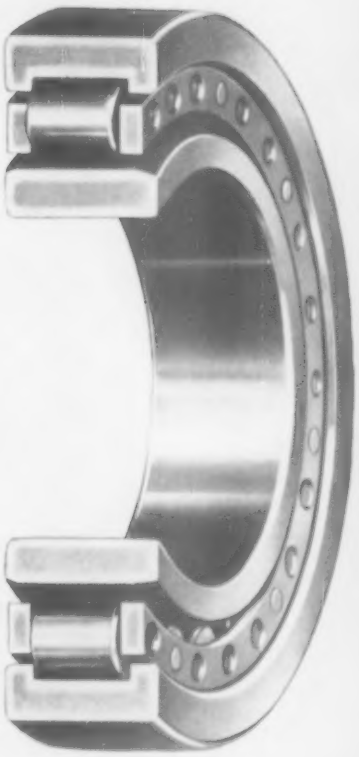

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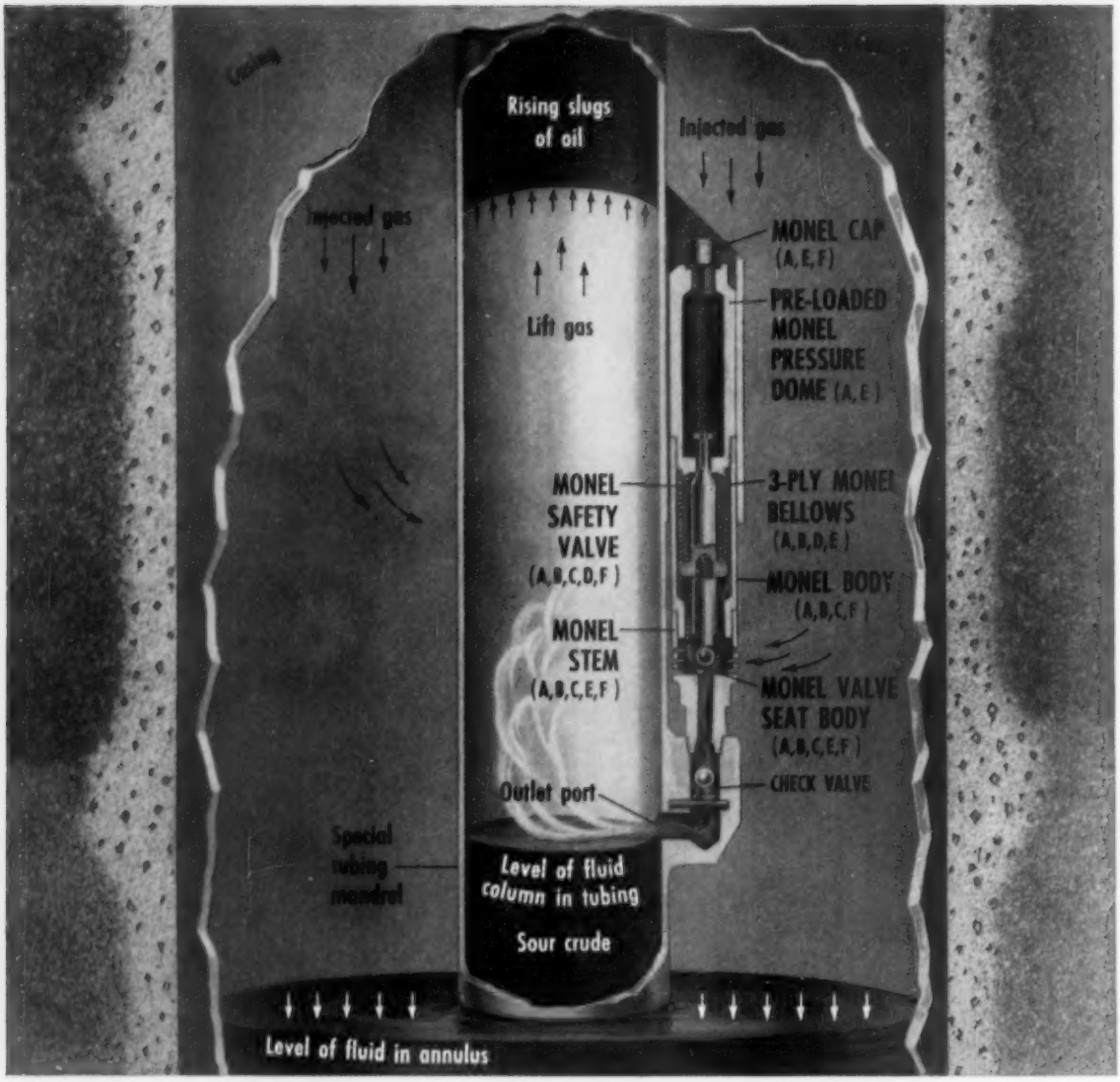

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Stripper Plant Boosts Pipeline Efficiency

By installing a liquid-removal plant this company upped pipeline efficiency from 76 to 92 per cent and kept it there. As a bonus, the stripper plant paid for itself in 3½ years from sale of removed liquids.

by A. W. Rifenburg

WET pipeline gas plagued Mississippi River Fuel Corp. in operation of its 22-in. line from Monroe, La., to St. Louis. Line efficiency dropped from 88 to 76 per cent in 2 years. Compressors were overloaded and required high maintenance. There was always a danger of a slug of liquid breaking a compressor head.

Then, in 1952, an absorption-type stripper plant was installed. The immediate benefit, with one line cleaning, was an increase in line efficiency up to 92 per cent. Besides this, the liquid-removal plant has paid for itself in direct returns from sale of removed gasolines. The line has not had to be cleaned in 3½ years and the 92 per cent efficiency has been maintained.

Mississippi River Fuel Corp. was organized in 1928 by producers in Monroe field of Louisiana to market gas in the large St. Louis industrial area. Fortunately, the Monroe field gas was almost perfect for pipeline transmission. The heating value was about 980 B.t.u. per cu. ft., the gas was extremely dry with respect to liquefiable hydrocarbons, and the only annoying operating problem was the need of removing water to prevent pipeline freezeups.

Author is with Mississippi River Fuel Corp. Paper presented at the pipeline conference, A.S.C.E., February 15-17, Dallas.

Later, it became necessary to obtain gas from sources outside of Monroe field. A second line from Monroe to St. Louis was started in 1946 and completed in 1949. In 1950, a gathering line was laid from Monroe to western Louisiana and East Texas to obtain additional gas supplies.

The composition of these new gas supplies was not so ideal for pipeline transmission. The gas was "wet," i.e., it contained many heavy hydrocarbons which condense under the conditions of temperature and pressure found in pipelines. The continued acquisition of wet gas gave trouble during the winter of 1950 after this new gathering line was connected to the No. 2 or high-pressure line to St. Louis.

The efficiency of the input section of the No. 2 line dropped 12 per cent within a few months, Fig. 1. The lost capacity was costly and endangered ability to supply the important winter load in St. Louis. A further concern was the hazard presented by the arrival of unprecedented quantities of condensed hydrocarbons or distillates at the gas-compressing stations and the attendant danger to personnel and equipment. Should liquids reach a gas compressor cylinder in sufficient quantity, breakage would occur and a serious fire most surely could result.

It was becoming an altogether too common occurence to walk into a compressor building filled with a blue smoke escaping from around the compressor rods. The distillate in the gas stream was washing away the lubricant from the metallic rod packing which permitted excessive wear and leakage to occur. Packing replacement was becoming a frequent and serious maintenance item. An added problem was that cylinder lube oil dilution was occuring, increasing cylinder and piston ring wear.

Source of liquids . . . A field survey was made to determine the source and extent of the problem. Gas scrubbers, which had been placed in the line to catch dirt and distillate from the gas stream, were catching both at unusually high rates. One scrubber at the south end of the line was found to be coated internally with a thick layer of black sludge on the gas inlet side. It was concluded from this that the line between the Monroe compressing station and the scrubber was also coated with sludge. The line section north of the scrubber was clean, but further condensation of distillate was occurring in it.

Both sections of line north and south of the inspected scrubber had subnormal capacities for carrying gas. Two contaminants, dirt and hydrocarbon liquids, were very obviously at the root of our trouble.

A major share of the gas entering the west line came from gasoline plants. Inspection of these plants showed no

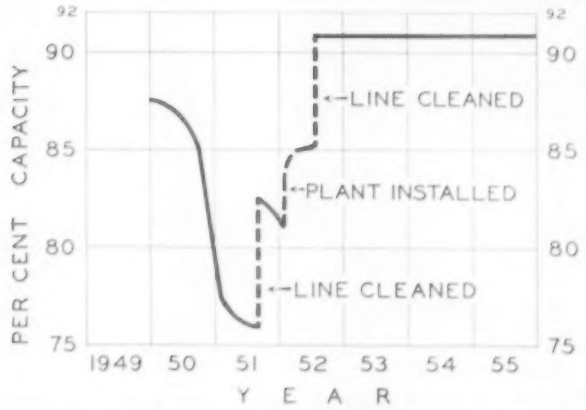


Fig. 1—How flow efficiency varied on Mississippi River Fuel's No. 2 main line. Absorber plant brought efficiency up to stay.

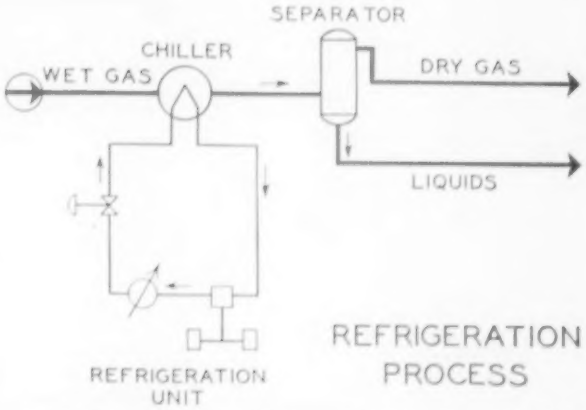


Fig. 2—Refrigeration process for removing liquids was considered but abandoned in favor of absorber.

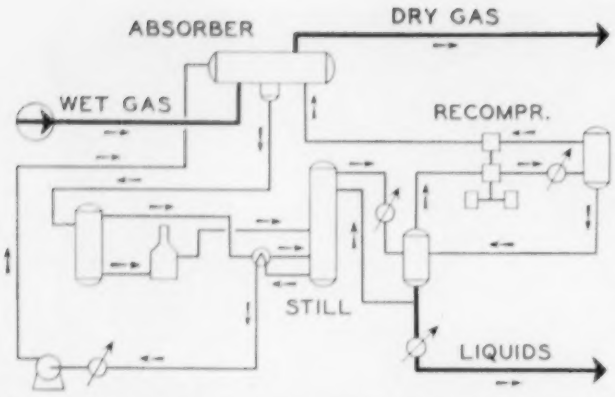


Fig. 3—Schematic of stripper plant installed at head end of line. Plant has paid out in 3½ years by sale of products alone.

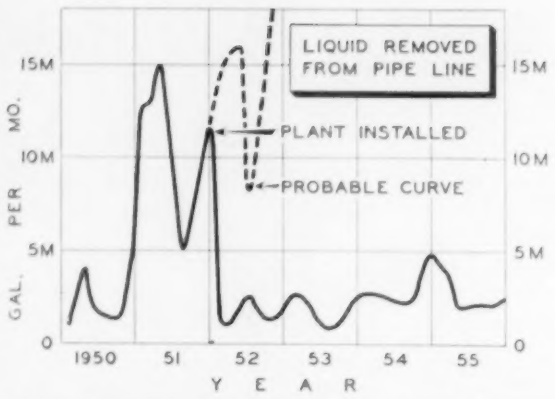


Fig. 4—Liquids removed at line drips show a marked decrease after plant went in.

unusual practices. It was possible that absorption-oil losses from these plants were contributing to our accumulations of distillate, but there was no proof of this.

Other natural-gas-pipeline companies were consulted and it was found that our problem with liquids and dirt was not unique. Three methods were in general use for the removal or elimination of contaminating materials:

1. The most frequently used method was to mechanically clean the pipeline internally with wire brushes and squeegees blown through the line by the gas pressure.

2. Siphons, drains, and gas scrubbers, installed for the purpose of removing liquid concentrations, were being used with some success. Siphons and drains are ineffective against dirt and only partially effective in catching liquids. Scrubbers can be reasonably effective in catching dirt but will not catch liquids which have not been condensed prior to reaching the scrubber.

3. Elimination of liquids in line by removal or separation of the condensable hydrocarbons from the gas stream and thus prevent further condensation of liquids downstream from such an installation.

During our investigation we tried installing and operating siphons in an effort to locate and drain liquid pockets in the line. Obviously, removal of liquid concentrations would eliminate restrictions to gas flow and improve line capacity. Several installations were made at low spots along the first 40 miles of line. We were not successful in locating any sizable concentrations of liquids and no increase in line capacity was observed.

Line pegging . . . A program of internal pipeline cleaning was then carried out. The first 44 miles of line was mechanically cleaned with gas-propelled wire brushes and squeegees. An increase of about 7 per cent in line capacity was the immediate result of this program. We were unable to remove all dirt and liquids from the pipe walls primarily because the pipeline had no facilities for inserting and removing pipeline cleaners during operation. It was therefore impractical to use a sufficient number of cleaners to remove all of the sticky distillate-dirt mixture. The mechanical cleaners would become quickly loaded and then slide in the sludge to the end of the section being cleaned. We concluded that liquids should be removed and the dirt deposits dried before the cleaning operation could become completely satisfactory.

Meanwhile, liquids were continuing to accumulate in the line at compressing-station suction piping. Pipeline and station maintenance continued to be a serious problem.

Two Possible Drying Methods

It was agreed that the preferred solution to the problem would be complete removal of the heavier condensable hydrocarbons from the gas at the input end of the transmission line and thus process all gas supplies in one operation as opposed to a method for mechanically collecting the liquids in a series of drips and station suction scrubbers. We believe that cleaning the gas, rather than continually cleaning the pipeline, would be a much less expensive procedure and in addition the over-all effectiveness would be much greater.

Two processes which were studied in detail for accomplishing the liquid removal were refrigeration and absorption. In the refrigeration process, Fig. 2, the gas is cooled by heat-exchange equipment to a temperature below that in the underground pipeline. Condensable liquids are removed from the gas stream which then passes into the pipeline.

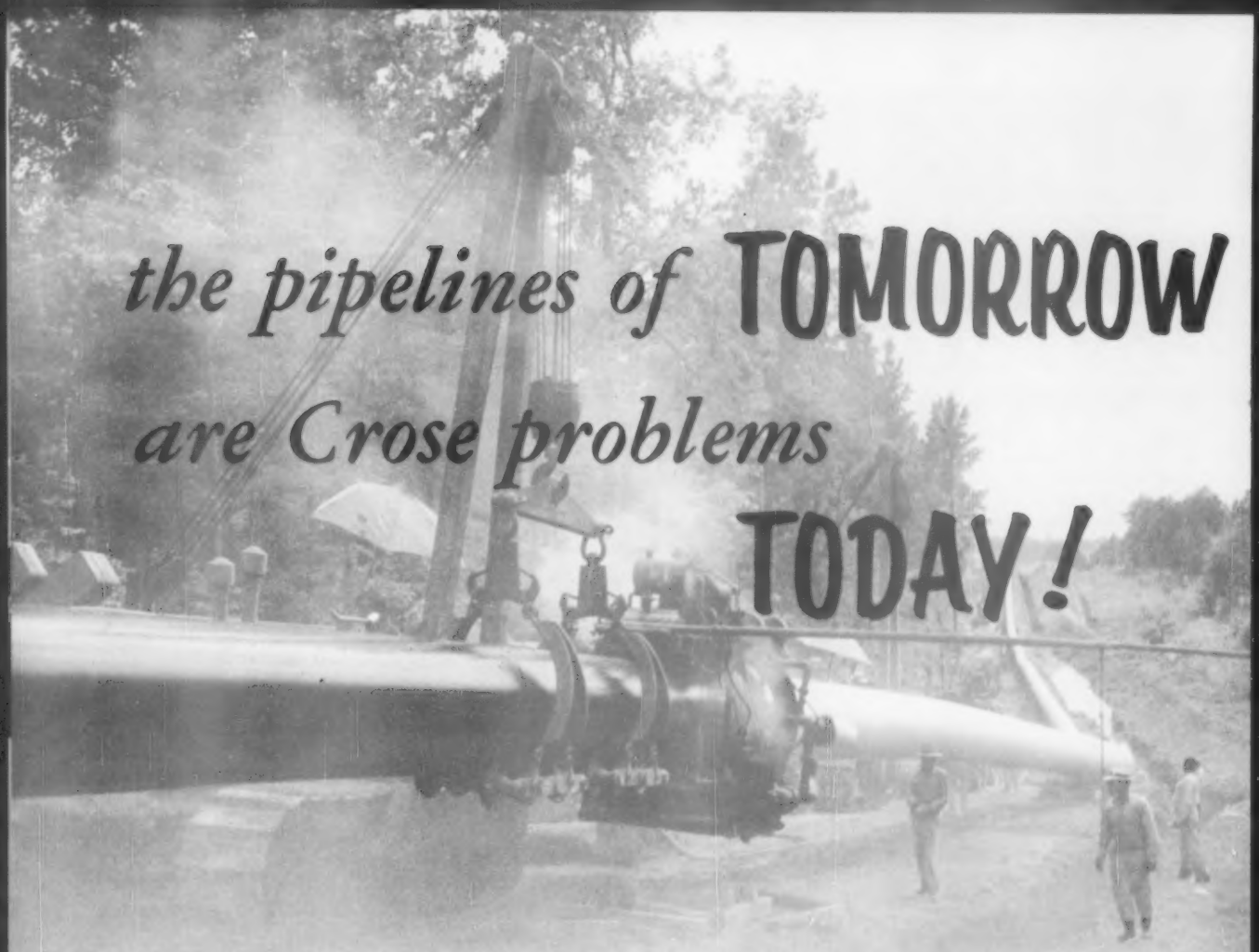
This process has the advantage of being able to produce a gas of known hydrocarbon dew point to insure against additional condensation of distillate as the gas progresses up the line. Engineering contractors will guarantee satisfactory results from this operation.

In the absorption process, Fig. 3, the gas is brought into intimate contact with a sponge or absorption oil. The heavy hydrocarbons are soaked up, leaving a residue gas practically denuded of liquefiable hydrocarbons. The absorption process has the advantages of lower initial investment, lower operating costs, together with a higher return from recovered products.

A disadvantage is that it is practically impossible to calculate effects of absorption-oil carryover upon the rate of liquid accumulation in the pipeline. It is inevitable that a certain portion of the absorption oil will vaporize as the gas is blown through it. Temperature and pressure conditions in the line become such that condensation of the absorption-oil vapor carryover is inevitable. Available data were inadequate for determining the quantities of condensate which might be expected.

A second effect to be considered was that of the viscosity of condensed liquids upon the resistance to gas flow in the pipeline. It was possible that a small amount of low-viscosity distillate on the pipe wall would decrease the resistance to gas flow whereas a film of heavy absorption oil would increase the resistance to flow. The net over-all effect of the absorption process might be a further loss in pipeline capacity. We believed, however, that the prime cause for efficiency loss was liquid accumulation and dirt rather than liquid film on the pipe wall.

Gambled on absorption . . . We reasoned that the absorption process could be designed to minimize liquid condensation and essentially eliminate compressing-station problems due to the liquids by using a heavy absorption oil



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with a narrow boiling range. That is, using an oil containing a minimum of light or volatile components for the minimizing of absorption oil carryover and as light an average specific gravity as would be possible to obtain, consistent with this prerequisite, for attaining a high absorption efficiency. It would be necessary to operate the plant in such a manner as to maintain the oil free of light or volatile components.

It was therefore decided to gamble upon the installation of a modified absorption plant designed to remove only enough condensable liquids from the gas stream to maintain the pipeline efficiency. As a further result of this installation, the intimate contacting of the oil and gas, necessary for the operation of the absorption process, would scrub or wash the gas free of all dirt which is then carried away in suspension with the oil. The gas coming into the line from foreign sources would be cleaned. The effects that dirt have upon the lowering of line efficiency and upon compression-station maintenance would be largely eliminated.

The process used is quite simple. All of the gas in the No. 2 line to St. Louis is intimately contacted at line pressure with a heavy absorption oil in a quantity to absorb sufficient hydrocarbons below the point where condensation will readily occur in the pipeline. The lean gas is returned to the pipeline for transmission.

The rich oil flows from the absorber at 700 psi. to the flash tank at 100 psi. The release in pressure on the rich oil is accompanied by a release of a portion of the absorbed vapors by a process called "flashing." The flashed vapors are separated from the rich oil and heated for use as a stripping medium in a still, thus obviating the necessity for steam. Steam would saturate the absorption oil with water and would in turn contaminate the gas stream. This would require dehydration before the gas stream could be transported to St. Louis.

The flashed rich oil from the flash tank is heated and then stripped of the remaining absorbed hydrocarbons in the still. The stripped oil from the base of the still is cooled and then pumped back to the absorber to repeat the cycle. The overhead vapors from the still are partially condensed. A portion of the condensed liquid is pumped over the top of the still as reflux. The uncondensed portion of the still overhead is recompressed through a two-stage electric-motor-driven compressor and introduced into the absorber to permit reabsorption of the liquefiable hydrocarbons contained in this gas.

The condensed liquids from the recompressor interstage cooler together with the liquids from the still condenser are sent to storage and then sold for use as motor fuel or blending stock.

Single tray absorber used . . . The absorber, a mechanical device for intimately contacting oil and gas, in conventional practice is a vertical vessel containing from 20 to 40 trays filled with "bubble caps" or similar contacting devices. The oil flows down through the absorber and across each tray in turn. The gas flows up through the vessel and bubbles through the oil flowing past each bubble cap. This plant employs a unique single-tray horizontal absorber. This design resulted in a savings amounting to approximately 30 per cent of the total plant investment when compared to a conventional vertical-type multitray absorber.

The plant is designed to operate without attendance by the liberal use of automatic controls. One man once or twice a day for about 1 hour each time is sufficient for the truck-loading operations involved in disposing of the liquid production. A complete automatic shutdown system is provided to safeguard personnel and equipment in the event of emergencies.

The recompressor is provided with automatic devices for maintaining a constant suction pressure; however, if these should fail for any reason, the gas normally pumped by the recompressor is automatically flared to atmosphere and the plant continues to remove condensable hydrocarbons from the No. 2 line gas stream. The cooling-water requirements for lean oil, gasoline, and recompressor cooling are taken from the nearby compressing-station gas-cooling-tower water-makeup line. The hot water from the plant is returned to the cooling tower basin as part of the makeup. Gas is used as the controlling medium for the instruments thus eliminating the need for an air compressor.

Plant payout . . . The original cost of the plant was $210,455. Additional facilities, which have included the recompressor, have brought the current capitalized value to $239,949. Gasoline production has averaged better than 5,500 gal. per day with a gross value of $443,397 in 3½ years of operation. Total operating costs during the same period including fuel, electric power, maintenance, and supplies are $130,816. Operating and maintenance labor and supplies have been negligible. The gross profit at the end of 3½ years is $312,581.

The most important feature of the installation is that the condensation of liquids dropped markedly immediately after the plant went into operation in January 1952. Fig. 4. Several locations which had accumulated better than 5,000 gal. per month dried up completely within 3 days. Station maintenance has been reduced sharply. The overload on gas pumping-station compressors has been reduced as a result of our ability to maintain higher suction pressures.

The input end of line No. 2 was cleaned internally 6 months after the plant went into operation and we were then able to obtain an optimum line efficiency. The line has not been cleaned during the past 3½ years because the flow efficiency has continued to remain at an optimum level as a result of the dirt and liquid removal. The initial problem, that of recovering and maintaining the pipeline capacity, definitely was solved and at no cost since the sale of gasoline eventually has paid for the installation and operational costs.

NELSON REFINERY CONSTRUCTION INDEX

Appears in the Engineering Section in the first issue each month.
Compiled by W. L. Nelson, petroleum refinery consultant, Tulsa.
The Index was explained July 7, 1952 (page 105) as well as the Indexes of Individual Items of Equipment that appear on the Cost-imating page in the first issues of the months of January, April, July, and October.

	Index (1946 = 100)					
	1949	1952	1953	1954	1955	Nov. 1955
Pumps, compressors, etc.	135.9	155.6	162.5	166.5	172.2	180.8
Electrical machinery	130.9	152.4	156.4	160.0	162.5	166.5
Internal-combustion engines	124.8	146.5	148.1	150.5	153.2	160.6
Instruments	123.1	146.2	151.8	154.6	162.9	168.8
Heat exchangers	133.0	165.8	174.9	171.7	156.8	162.9
Miscellaneous equipment average	*121.6	153.3	158.8	160.7	161.5	167.9
Materials component	143.6	164.3	172.4	174.6	176.1	181.6
Labor component	137.1	163.1	174.2	183.3	189.6	192.7
Nelson construction index	139.7	163.6	173.5	179.8	184.2	188.3

*Used in computing the Nelson Index until April 1952. This is slightly different from the average of the Miscellaneous Equipment Items shown above.

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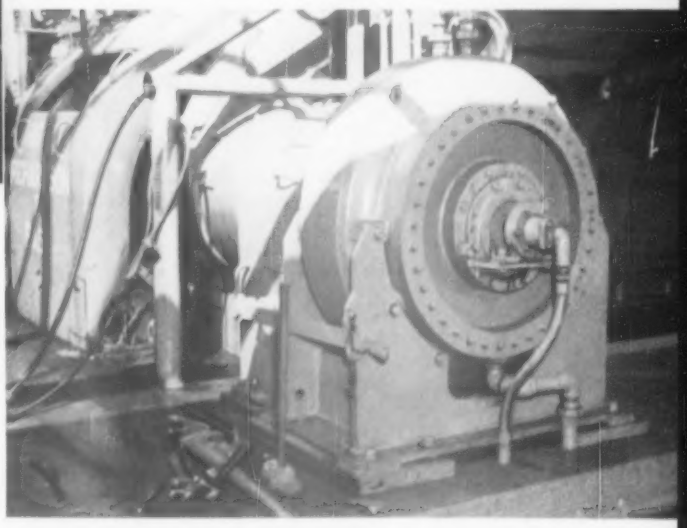

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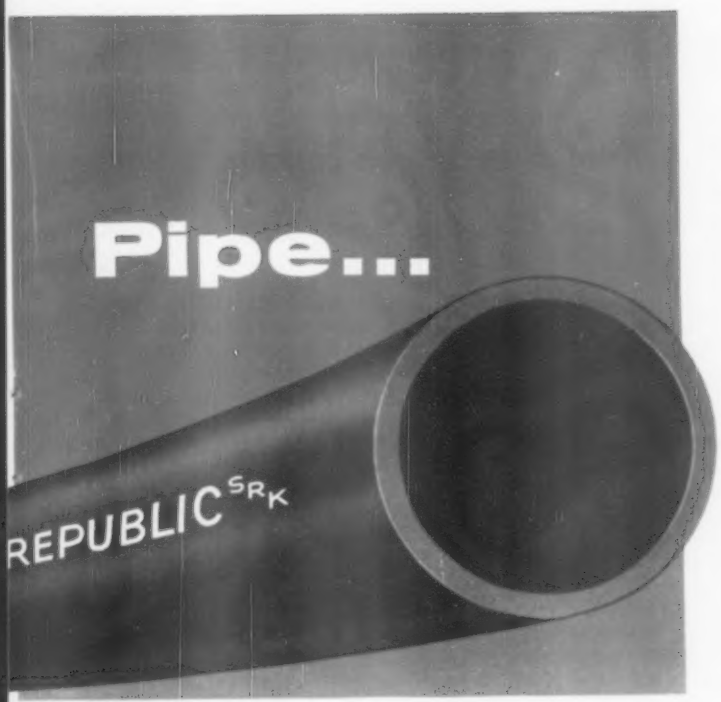

out of Corrosion

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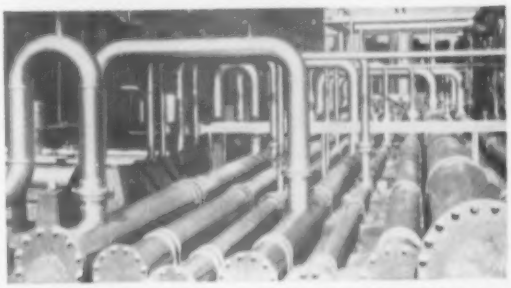

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Three Ways to Fight H_2S Corrosion

. . . in units with high hydrogen concentration

by E. B. Backensto, R. D. Drew, and C. C. Stapleford

RESULTS reported from laboratory, pilot, and commercial units have shown that hydrogen sulfide corrosion can be a serious problem when processing petroleum stocks with hydrogen at high temperatures and pressures. Three methods for minimizing such corrosion are proposed: (1) reduction of H_2S in process streams, (2) use of chrome-nickel alloys, and (3) protection by metals by aluminum coating.

When hydrogen sulfide corrodes carbon and low-chrome steels an iron sulfide corrosion scale is formed. The literature on the effects of hydrogen sulfide and hydrogen separately is voluminous. Limited information is available on the combined effects of hydrogen-hydrogen sulfide.[1,2] These data, however, are based on short-term tests, generally at higher pressures and hydrogen sulfide concentrations than are likely to be encountered in the petroleum industry.

- Hydrogenation-plant experiences served as a forewarning of the seriousness of this problem in catalytic reformers. Nelson[3] defined the sulfide scaling problem and indicated the need for high-chrome alloys.

- But, on the other hand, the petroleum industry had considerable experience in using low-chrome steels without difficulty in fractionation, catalytic and thermal cracking, and thermal reforming equipment. Therefore, when designing catalytic reformers, economics appeared to favor low-chrome steel construction, since the seriousness of sulfide corrosion was not fully understood.

- For example, the first Thermofor catalytic reformer (T.C.R.) was put on-stream in the summer of 1954 at the Torrance, Calif., refinery of General Petroleum Corp. to reform high-sulfur naphthas. On inspection after 42 days of operation, deposits up to 0.1 in. thick were found throughout the hot sections of the unit on all types of steel with the exception of 18-8 stainless steel. During this period of operation the process vapors in the unit contained up to about 2 volume per cent H_2S.

Authors are with Socony Mobil Oil Co., Inc., research and development department, Paulsboro, N. J. From paper presented at N.A.C.E. south-central regional meeting, Houston.

A program was started to include tests in commercial reforming units, in laboratory pilot units utilizing hydrogen, and in laboratory corrosion units.

In commercial reforming units, corrosion test racks containing 20-30 coupons of different metals were placed at critical locations; 10 racks in each of two T.C.R. units and 7 racks in each of two Sovaformers.

In laboratory pilot units, as many coupons as possible were located, usually in the catalyst bed, in the following type units: naphtha desulfurization and pretreaters, Sovaformers, hydrocrackers, and lube-oil hydrotreaters—all of 1-bbl. per day capacity—and in an 80-bbl. per day fuel-oil desulfurization unit.

Laboratory corrosion units were constructed of pressure bombs and necessary auxiliary equipment to subject test coupons to a stream of hydrogen-hydrogen sulfide at controlled concentrations, temperatures, and pressures. More than 80 runs, each including 15-25 different test coupons, were made in these corrosion units covering the following ranges of conditions: 0.002-1.0 volume per cent H_2S, 500°-1,300° F., and 0-500 psig. hydrogen pressure.

If the sulfide scale is affixed tightly to the metal walls, it may offer some resistance to further corrosion. If, however, the scale is jarred loose by any means, or flakes off during shutdowns due to differences in thermal expansion of the scale and metal, the exposed fresh metal is again susceptible to rapid corrosion, and the dislodged scale may cause serious pressure-drop difficulties and, ultimately, plugging.

Test Results

Chemical analyses of the metals used in the experiments reported herein are summarized in Table 1.

Typical behavior of chrome steels under hydrogen-hydrogen sulfide corrosion at 1,175° F. and 175 psig. is shown in Fig. 1. The lower numbers represent straight chrome steels, while the high chrome contents represent chrome-nickel alloys of 18-8, 25-12, and 25-20. The corrosion rates increase with H_2S concentration, particularly for the low-chrome steels. The rate curves usually drop off rapidly in the 7-16 per cent chrome range.

For all tests made to date, the chrome-nickel alloys have consistently provided the best corrosion resistance while the carbon and low-chrome steels have exhibited the poorest corrosion resistance. The intermediate group of 7-16 per cent chrome steels are unpre-

REFINING

Table 1—Chemical Analyses

Description—	Supplier	Heat number
Carbon steel—A.S.T.M. A-7	Morris, Wheeler & Co.	
Carbon steel—A.S.T.M. A-83—Type A	Hill Chase	
Carbon steel—A.S.T.M. A-201—Grade A	Morris, Wheeler & Co.	23,522K
Carbon steel—A.S.T.M. A-285—Grade C	Morris, Wheeler & Co.	13,412
1 Cr—½ Mo	Timken Roller Bearing Co.	14,856
1¼ Cr—½ Mo	Timken Roller Bearing Co.	17,990
2¼ Cr—1 Mo	Timken Roller Bearing Co.	23,237
5 Cr—½ Mo	G. O. Carlson Co.	RO-45,485-6A
7 Cr—½ Mo	Timken Roller Bearing So.	23,379
9 Cr—½ Mo	Timken Roller Bearing Co.	11,977
12 Cr—Type 405	G. O. Carlson Co.	52,426-2A
12 Cr—Type 410	G. O. Carlson Co.	54,034-1A
16 Cr—Type 430	G. O. Carlson Co.	54,137
25 Cr—Type 446	G. O. Carlson Co.	A46,849
18-8—Type 302	Allegheny	42,950
18-8—Type 304	G. O. Carlson Co.	64,343-2B
18-8—Type 304L	G. O. Carlson Co.	64,541-2B
18-8—Type 316	G. O. Carlson Co.	64,073-1C
18-8—Type 316L	G. O. Carlson Co.	64,307-2
18-8—Type 317	G. O. Carlson Co.	44,562
18-8—Type 321	Allegheny	52,064
18-8—Type 347	Republic	625,526
25-12—Type 309	G. O. Carlson Co.	54,580-24
25-12—Type 309CBS	G. O. Carlson Co.	53,785-2D
25-20—Type 310	G. O. Carlson Co.	54,038-1B

dictable; at most conditions they are usually no better than the lower chrome steels—at mild conditions they show increasing resistance with chrome content. We have not obtained any significant differences in corrosion rates between carbon steels and steels containing up to 5 per cent chrome. Under certain conditions no significant difference in corrosion rate was found for the group of 0-9 per cent chrome steels.

The corrosion rates drop off rapidly with a decrease in H_2S concentration.

Low H_2S concentration runs were also made to determine at what point actual scaling occurred. A thin film of powdery corrosion products appeared on steels containing up to 2¼ per cent chrome at 0.006 volume per cent H_2S and this type of corrosion was evident for all steels containing up to 9 per cent chrome at 0.01 volume per cent H_2S. In no case at the low concentrations was there evidence that scale would form on the chrome-nickel alloys. From observations in the laboratory, flaky corrosion scale generally forms on steels which exhibit corrosion rates of about 0.01-0.02 in. per year or higher, regardless of chrome content. Generally the scale is less flaky and more tightly adhering for the high-chrome alloys.

Typical corrosion test results are shown in Table 2. In this test the effluent gases from the pressure bomb were passed through a second bomb maintained at atmospheric pressure. Corrosion rate determinations on the same type metal in triplicate are reported in Table 3. These data demonstrate the accuracy and reproducibility of the test data reported.

The corrosion rate increases with H_2S concentration. This effect is shown in Fig. 1, and in Table 4 for H_2S partial pressures from 0.25 to 1.0. With the exception of the chrome-nickel alloys, the corrosion rates increase, but not linearly, with partial pressure. At the two total pressures shown there are no significant differences in corrosion rates at the same H_2S partial pressure. Note that these results are for short-term tests, therefore the corrosion rates should be used for comparative purposes only.

The effect of H_2S partial pressure is not as pronounced in longer term tests, especially at higher pressures, as shown in Fig. 2. Here it may be noted that the corrosion rate increases to about 200 psia. and then tends to level off. The corrosion rates for the chrome-nickel alloys are not plotted on this figure since they were low and showed no trend.

Temperature is another important variable. For most conditions below 500° F. the corrosion rates increase rather rapidly to 1,000° F. At about 1,000° to 1,200° F. the corrosion rate appears to reach a maximum and then drops off with further increase in temperature. The temperature at which this maximum is reached appears to depend on the type of metal; being about 1,200° F. for the carbon and low-chrome steels and somewhat less as the chrome content of the metal is increased.

Fig. 3 shows the effect of tempera-

TABLE 2—TYPICAL CORROSION TEST RESULTS

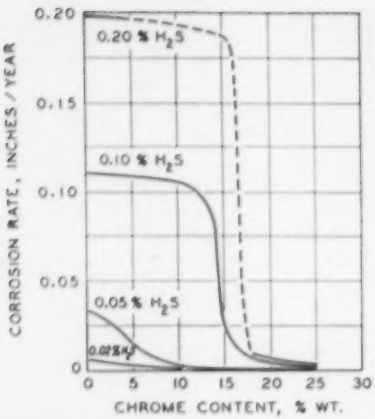
Average conditions:		
Temperature, °F.	850	850
Hydrogen pressure, psig.	0	485
H_2S, vol. per cent in H_2:		
Inlet	0.087	0.111
Outlet	0.081	0.087
Length of test, hours	224	224
	Corrosion rate, in. per year	
Material tested—		
Carbon steel—A.S.T.M. A-7	0.0351	0.107
Carbon steel—A.S.T.M. A-83-A	0.0494	0.127
Carbon steel—A.S.T.M. A-201-A	0.0415	0.095
1 Cr—½ Mo	0.0400	0.117
2¼ Cr—1 Mo	0.0394	0.108
5 Cr—½ Mo	0.0376	0.0918
7 Cr—½ Mo	0.0343	0.0988
12 Cr—Type 405	0.0238	0.0178
12 Cr—Type 410	0.0234	0.0239
16 Cr—Type 430	0.0146	0.0154
18-8—Type 302	0.0041	0.0074
18-8—Type 304	0.0034	0.0052
18-8—Type 304L	0.0032	0.0059
18-8—Type 347	0.0031	0.0056
25-12—Type 309	0.0031	0.0025
25-12—Type 309CBS	0.0022	0.0022
25-20—Type 310		0.0018

TABLE 3—CORROSION RATE DETERMINATIONS IN TRIPLICATE

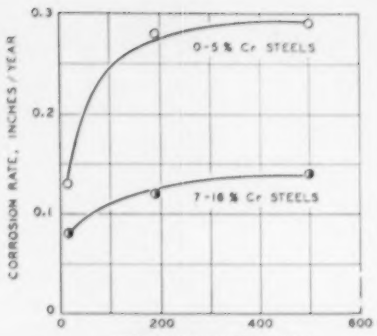
Average conditions:	
Temperature, °F.	986
Hydrogen pressure, psig.	484
H_2S volume per cent in H_2:	
Inlet	0.10
Outlet	0.08
Length of test, hours	24
Material tested—	Corrosion rate, in. per yr.
Carbon steel—A.S.T.M. A-285-C	0.629
Carbon steel—A.S.T.M. A-285-C	0.625
Carbon steel—A.S.T.M. A-285-C	0.630
5 Cr—½ Mo	0.639
5 Cr—½ Mo	0.648
5 Cr—½ Mo	0.660
7 Cr—½ Mo	0.592
7 Cr—½ Mo	0.635
7 Cr—½ Mo	0.635
9 Cr—½ Mo	0.552
9 Cr—½ Mo	0.535
9 Cr—½ Mo	0.581
12 Cr—Type 405	0.382
12 Cr—Type 405	0.352
12 Cr—Type 405	0.459
16 Cr—Type 430	0.229
16 Cr—Type 430	0.225
16 Cr—Type 430	0.232
18-8—Type 321	0.0594
18-8—Type 321	0.0636

of Metals Used in Corrosion Tests

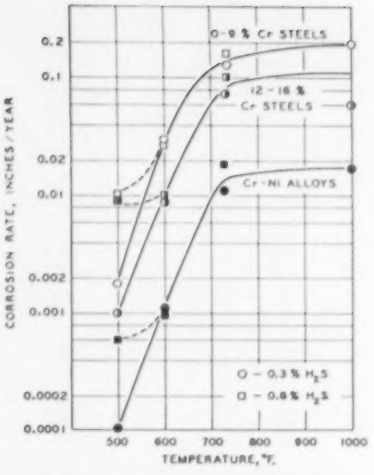
Chemical analyses (balance Fe), per cent weight												
C	Cr	Ni	Mo	Mn	P	S	Si	Al	Cu	Ta	Cb	Ti
0.20-0.35					0.10 max.	0.05 max.						
0.06-0.18				0.27-0.63	0.048 max.	0.058 max.						
0.19				0.48	0.010	0.024	0.20					
0.16				0.38	0.014	0.040						
0.10	0.97		0.55	0.36	0.011	0.014	0.25					
0.09	1.20	0.27	0.53	0.50	0.013	0.014	0.70					
0.11	2.36	0.24	1.02	0.30	0.018	0.017	0.34					
0.06	4.96	0.10	0.49	0.39	0.023	0.023	0.31					
0.125	6.35	0.15	0.54	0.36	0.014	0.025	0.84					
0.11	8.03	0.48	0.97	0.48	0.019	0.011	0.68					
0.048	12.47	0.30		0.76	0.016	0.015	0.51	0.22				
0.069	12.71	0.31	0.44	0.39	0.018	0.017	0.39		0.14			
0.088	17.82	0.33		0.58	0.020	0.014	0.46		0.12			
0.15	26.14	0.32		0.83	0.026	0.019	0.70					
0.086	17.57	8.71		0.85	0.028	0.022	0.41		0.23			
0.055	18.56	9.42		0.67	0.030	0.025	0.44		0.25			
0.028	18.29	9.44		1.09	0.024	0.013	0.39		0.19			
0.041	17.78	12.93	2.42	1.84	0.023	0.017	0.70		0.20			
0.019	17.60	13.80	2.75	1.50	0.021	0.019	0.55		0.34			
0.074	18.64	13.68	3.22	1.75	0.024	0.019	0.55		0.24			
0.05	17.42	10.55		1.54	0.024	0.025	0.95		0.32			0.34
0.054	17.75	10.75		1.80	0.028	0.017	0.55				0.94	
0.060	22.24	14.62		1.93	0.020	0.014	0.46		0.17			
0.057	23.05	15.48		1.81	0.021	0.019	0.52			0.08	0.54	
0.060	24.76	20.07		1.25	0.021	0.015	0.55		0.12			



CORROSION RATE of chrome steels in H_2S at 1,175° F. and 175 psig. hydrogen pressure. Fig. 1.



EFFECT OF HYDROGEN pressure on corrosion rate at 985° F. and 0.2 per cent volume of hydrogen sulfide. Fig. 2.



EFFECT OF TEMPERATURE and concentration on hydrogen sulfide corrosion at 465 psig. hydrogen pressure. Fig. 3.

ture at higher H_2S concentration. The effect of concentration is not consistent over the entire temperature range studied. For example, at 500° F. the corrosion rates at 0.8 volume per cent H_2S are about eight times the rates obtained at 0.3 per cent volume per cent H_2S; at 600°-735° F. there are no significant differences in corrosion rates between 0.3 and 0.8 volume per cent H_2S.

Corrosion rates reported so far have been obtained from test coupons subjected to various atmospheres of H_2-H_2S. A 3-week run was made in the laboratory to simulate naphtha furnace conditions by pumping a mixture of Kuwait naphtha vapor, 0.085 volume per cent H_2S, and 11.1 volume per cent H_2 through a 5 per cent chrome tube in a gas-fired furnace. During this test the 5 per cent chrome tube formed scale near 1/64 in. thick. This scale analyzed 62 per cent iron which means essentially iron sulfide and no coke. The scale was flaky after cooling.

Gas velocity often has an important effect on corrosion rate; however, in all of our studies of hydrogen sulfide corrosion we found no significant differences in corrosion rate due to gas velocity over a wide range.

There are probably many other things that affect sulfide corrosion rate. Some of these other variables that we have studied to a limited extent are discussed below:

(1) **Specimen pretreatment** with hydrogen or air, (2) effect of **diluent gas** for H_2S, and (3) effect of **moisture.**

The question of hydrogen blistering always arises when dealing with corrosion in hydrogen atmospheres. Under the conditions covered in our study, however, this does not appear to be a major problem.

It appears that there are two possible ways to minimize hydrogen sulfide corrosion; the choice depending on economic considerations. One is the use of chrome-nickel stainless steels. Another is the reduction of H_2S concentration in the environment, for example by desulfurization of the charge stock to the process or by removal of H_2S from recycle gas streams. A third method is the protection of metal surfaces by coating with aluminum.

The following types of aluminum coatings were tested:

1. Calorized (an aluminum diffusion process) carbon steel.

2. Several aluminum dipping processes on carbon steels and steels containing up to 7 per cent chrome.

3. Metallized aluminum of different thicknesses on a low-chrome steel.

At these conditions only calorized carbon steel showed no attack. The aluminum overlay and most of the bond material disappeared for the metallized and aluminum dipped specimens. With the exception of the calorized specimen, and regardless of base metal, some grain growth was noted after the test in the base metal along the surface that had been coated.

Calorized carbon steel has consistently passed laboratory sulfide corrosion tests. Calorized specimens showed no apparent attack after 55 days' exposure to 0.5 volume per cent H_2S at 935° F. and 175 psig. hydrogen pressure. At lower H_2S concentrations, for test periods as long as 33 days, this type of coating has been satisfactory up to 1,000° F. and 500 psig. hydrogen pressure. It is important to maintain a continuous coating if calorizing is expected to give satisfactory service in H_2-H_2S atmospheres.

TABLE 4—EFFECT OF H_2S PARTIAL PRESSURE ON CORROSION RATE
(24-hour tests at 985° F.)

H_2S part. pres., psi.	0.25	0.5	0.5	1.0
Total H_2S and H_2 pressure, psig.	235	485	235	485
	Corrosion rate, in./yr.			
0-5 per cent Cr	0.49	0.64	0.63	0.81
7-16 per cent Cr	0.36	0.46	0.49	0.58
Cr-Ni	0.07	0.06	0.07	0.07

Laboratory tests of less than 10 days have shown that aluminum-dipped carbon steel shows no visible attack for conditions up to 1,000° F. and 500 psig. hydrogen pressure. At the same conditions, longer-term tests (of 20-35 days), however, showed that the aluminum overlay disappeared and, if the test period was long enough, even the bond material disappeared leaving the steel unprotected. At temperatures of 600°-700° F., aluminum-dipped carbon steel has afforded satisfactory protection for test periods as long as 55 days.

In case of the T.C.R. unit corrosion problem mentioned in the beginning of this report, the following changes were made. An amine scrubber was installed to lower the H_2S content in the recycle gas to about 0.03 volume per cent. All the hot transfer lines were calorized and critical sections of the reactor and kiln were replaced with 18-8 stainless steel. The unit was put back onstream and brought down after 55 days of operation for a corrosion inspection. This inspection showed that the unit was in excellent condition and, therefore, was put back in operation without further changes.

Acknowledgment . . . The authors wish to express their appreciation to J. E. Prior, of our laboratories, who conducted the metallographic examinations in connection with this work.

References

1. Dittrich, E., Die Chemische Fabrik, 10, 145-150 (1937).
2. Baukloh, W., and E. Spetzler, Korr. u. Metalsch., 16, No. 4, 116-121 (1940).
3. Nelson, G. A., Trans. A.S.M.E., 73, 205-213 (1951).

alkylation

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The persistent trend to higher compression ratios in automotive engines is focusing attention on alkylation as an important process means for increasing a refinery's Octane potential.

Foster Wheeler is currently designing and constructing an alkylation unit for a midwestern refiner which will produce 3800 bbl/day of motor alkylate. This unit features "effluent refrigeration," the most significant advance in alkylation technology in 15 years.

The unit shown in the photograph, recently completed for a South American refiner, is but one of the 17 alkylation units designed and constructed by Foster Wheeler. This cumulative experience is available to refiners everywhere — for evaluating the economics of the process and undertaking full responsibility for plant design and construction. For complete information, write to *Foster Wheeler Corporation, 165 Broadway, New York 6, N.Y.*

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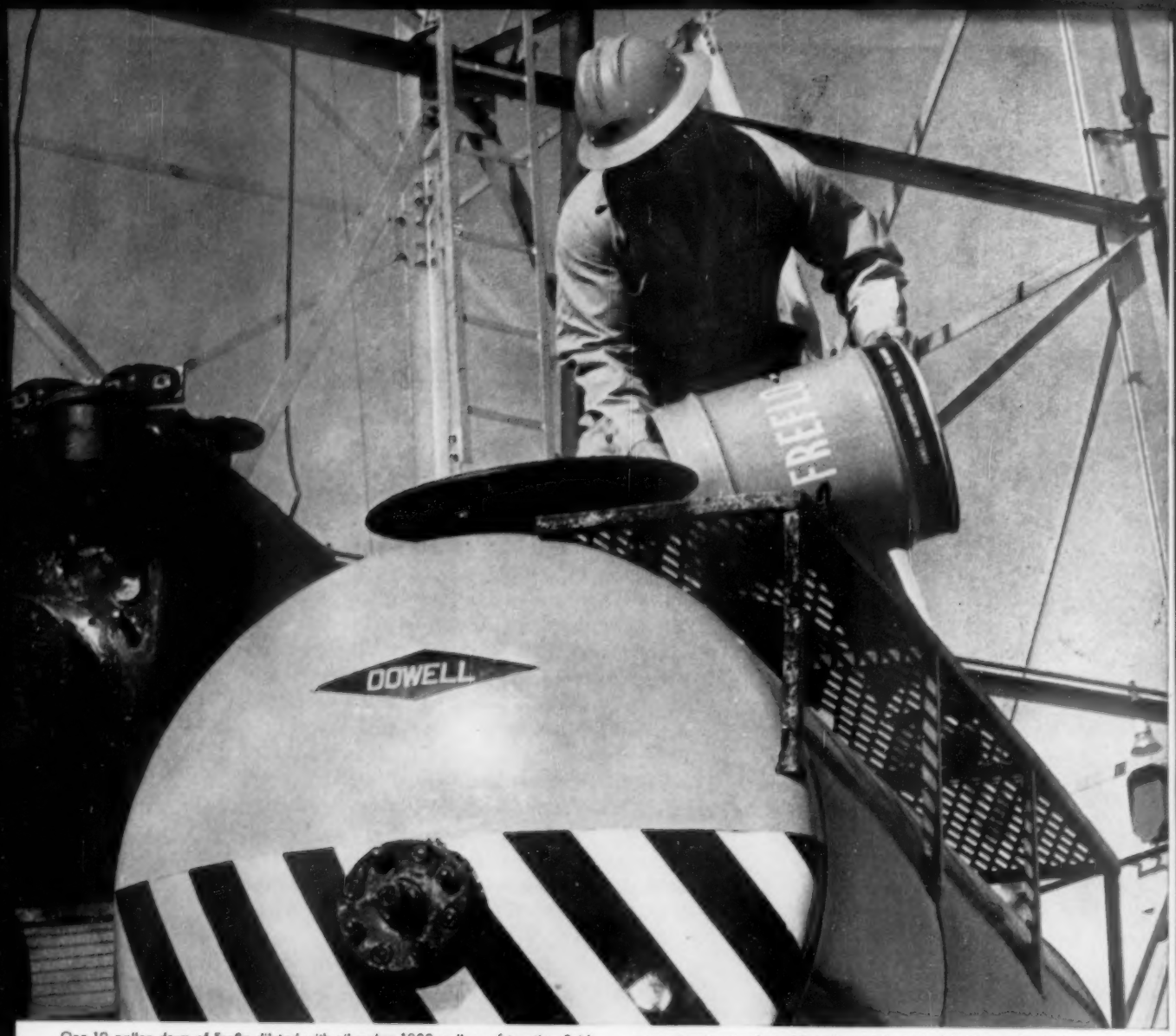

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TWO TRACTORS were moved to location in case additional power was necessary, but one furnished plenty of power to haul 324,000-lb. vessel from Benedum to Midkiff plant near Midland, Tex.

Giant Vessel Is Taken for a Ride

by Frank J. Mangum

THE heaviest vessel ever hauled by El Paso Natural Gas Co. was slowly maneuvered into place at the company's new Midkiff gasoline plant near Midland, Tex.

The 77-ft., 324,000-lb. deethanizer required construction of a special wagon to move it from the nearest railroad siding at Benedum, 30 miles away. The vessel was much too heavy to travel on Texas highways, so the entire trip had to be made in the "bar ditch," a graded, sandy strip alongside the pavement.

Special trailer built . . . For this and many other heavy hauling jobs, El Paso Natural has designed and constructed a rig capable of handling loads up to 600,000 lb. The crawler trailer, as it is known, is actually two separate units connected by a large steel tongue. This tongue is made in three bolted sections so that the unit can be lengthened or shortened.

The trailers are equipped with heavy-duty tracks and sprockets. Eight-inch wide-flange double-decked steel beam was used to tie each set of tracks together.

To keep the tongue from sagging in the middle under heavy loads, "boomer chains" are fastened securely around the vessel and tongue to keep the load intact.

This rather uneventful trip from Benedum railroad siding to Midkiff plant was not exactly typical, however, of El Paso Natural's heavy hauling operations. The West Texas desert in this instance proved to be dry and flat with a minimum of turns and natural hazards. A speed of about 3 m.p.h. was maintained and vehicle was halted for greasing only twice.

Heavy hauling in San Juan . . . The company's jobs in the San Juan basin of northwestern New Mexico have been of an entirely different nature, however. There, it is a story of natural barriers, rivers, mountainous terrain, weather, and distance.

Natural-gas-treating vessels hauled in to the San Juan River plant near Farmington, N. M., had to be moved all the way from Gallup, the nearest standard-gage railroad siding. There are 137 miles of highway and more than 50 bridges.

Generally, loads approaching 100,000 lb. are not even considered for the highways and the company must get to its destination by other routes. Usually this means traveling over pipeline right-of-way, sandy desert roads, or just taking off across country. It also means fording rivers like the unpredictable and sometimes swollen San Juan.

Recent trips in the San Juan basin hauling large vessels and engines to the company's Blanco gasoline plant—also near Farmington—have been a bit easier. The heavy material has been unloaded at Wingate, a few miles east of Gallup, and hauled directly up the right-of-way on El Paso's products line.

It is not unusual in this area to have four tractors hitched to the big rig—especially when the going gets rough. On back-country desert roads or pipeline right-of-ways the hauling caravan is entirely isolated from civilization. All supplies and materials necessary to keep the crawler tractor and its load moving have to be carried along.

Vehicles needed . . . A typical complement of vehicles on a big moving job includes a halftrack carrying grease, spare parts, a welder and welding machine; a pickup truck and a sedan, both with two-way radio equipment; four tractors, and a large winch truck.

Crews usually work on 12-hour shifts, and once the rig has started on its journey, it moves day and night. The only stops made are those for repairs, lubrication, or grading and clearing roadbed. The trip from Wingate to the Farmington area usually takes 3 full days on the pipeline right-of-way.

Dirt and dust are nearly always a constant problem. Dozer operators have to wear goggles and other safety equipment for protection from dust. Cars and trucks become stuck in the deep sand frequently, and have to be retrieved by the halftrack.

Author is with El Paso Natural Gas Co., El Paso, Tex.

"From spud to pay I beef up

my rigs with 'U. S.' products..."

says toolpusher "Red" Royal

Hard-driving, hard-working "Red" picks "U. S." products to "put muscles" on his rig. He knows from experience that "U. S." products are the *best* insurance against downtime he has ever found. They are designed and made by men who know all about oil field problems—men who are out to help the driller get more and more footage—in less and less time—at less cost.

"I use it all the way from spud to pay—no switching of hose!" says "Red" Royal about U. S. ROYAL 4 ROTARY HOSE.
"In Texas, just one U. S. Royal 4 drilled over 300,000 feet in over 3 years, at a hose cost of less than a penny a foot drilled!" No need to keep money tied up in stand-by hose to finish wells. U. S. Royal 4 handles the highest pressures . . . no downtime in order to switch. No lubrication needed; complete flexibility from nipple to nipple.

"I insist on belts that have *proven* they wear longer. That's why I always see to it that U. S. RAINBOW® V-BELTS are on my rigs."
Take, for instance, this performance record: On a composite drive U. S. Rainbow V-Belts drilled over 218,970 feet of hole, moving from location to location. At last count, they were still on the job after 43 months. The contractor says the belts he had previously used *failed after three wells.*

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U. S. GIANT HEAVY DUTY MUD PUMP SUCTION HOSE P-8048.
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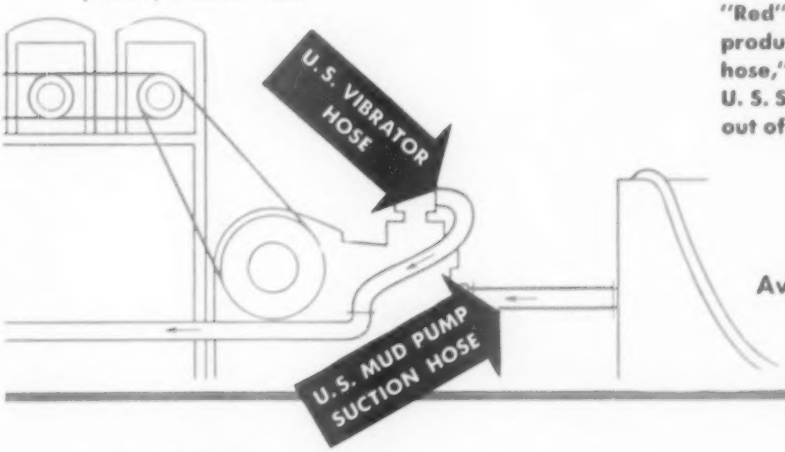
"Red" Royal also relies on plenty of other "U. S." products. "I use other types of 'U. S.' oil field hose," says "Red," "plus 'U. S.' packings and U. S. Super-Service V-Belts. I always get the best out of my rigs, and 'U. S.' helps me do it."



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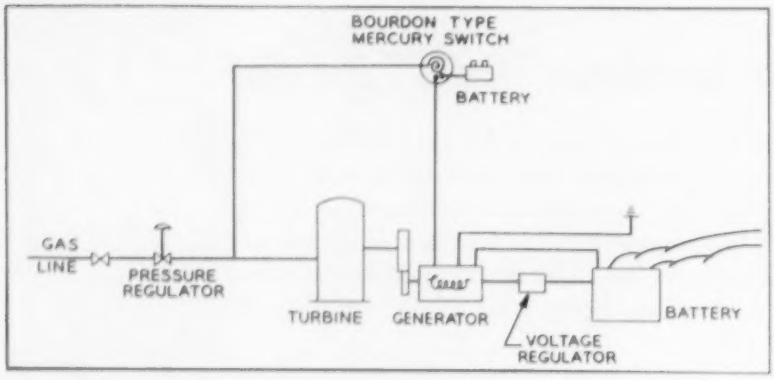


La Gloria improves a remote radio setup

OPERATION of a remote radio installation used by La Gloria Corp. in its South Texas operations is aided by a small gas turbine driving a generator as indicated in the sketch.

By opening the valve on the gas line, the high-pressure gas stream is admitted to the system and is reduced in pressure to 20 psig. for operation of the turbine. At the same time, a sidestream of this low-pressure gas is used to actuate a bourdon-type mercury switch which connects a battery to the excitation coils of the generator. This setup is used in place of a conventional engine that requires cranking.

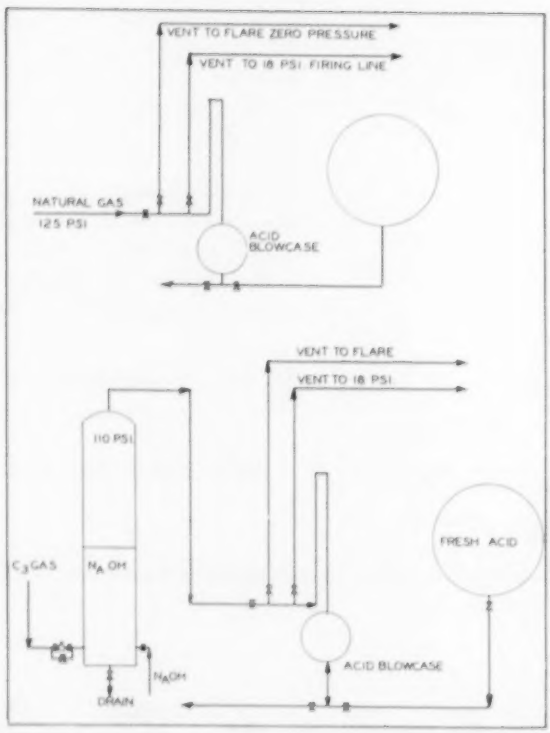
How to use gas to move acid in plants

NATURAL gas or propane instead of compressed air may be used to advantage in moving acid in alkylation plants.

In one method, natural gas from a 125-lb. line is piped to the acid blowcase, which receives acid from the fresh-acid drum. This pressure is then used to move the acid from the blowcase into the processing units.

In an alternate method, propane gas from a stabilizer is used to pressure the blowcase. This is first scrubbed with caustic, leaving the scrubber at 110 lb.

The method is superior to the use of compressed air, for it (1) eliminates any moisture content of air which may weaken the acid; (2) cuts down corrosion which is especially severe when moisture is present in acid lines; and (3) eliminates the chance that air may be carried over into light hydrocarbon streams. An additional feature is that it permits the air compressor to be relieved for other plant uses.

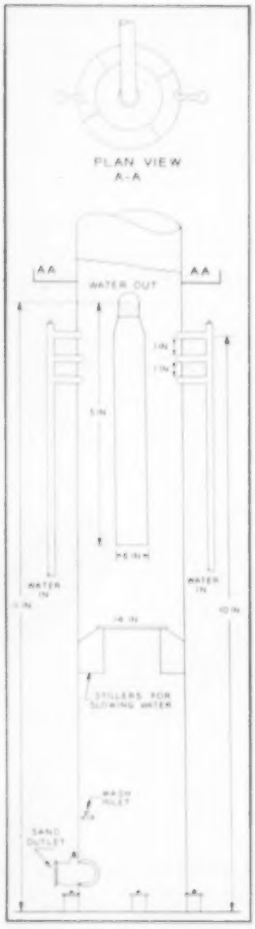


Courtesy of Sinclair Refining Co., Houston.

Centrifugal separator removes sand from makeup water

SAND and gas are being effectively removed from well makeup water at the Plomo Co.'s Robstown, Tex., cycling plant. And it's being done with a plant-built centrifugal-action separator.

Incoming water is directed as shown in the plan view A-A in the sketch,



with sand settling to the bottom and gas escaping overhead through a vent line. As water enters the separator, it passes through a set of tube turns which deflect it 90° and impart circumferential flow to the incoming stream.

The separator body consists of a

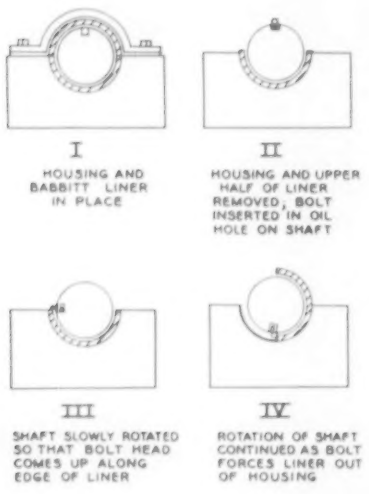
joint of 20-in. pipe supported vertically and sealed off at top and bottom, with a vent line overhead. A valve is located at the bottom of the separator and is used to discharge accumulated sand. Two 1-in. wash lines are welded about a foot above the valve. Through them water may be injected should the sand pack in the bottom of the separator. Normally the sand will flow freely.

The steel plate, located below the 6-in. line, has fins radiating outward which act as stillers in slowing the swirling water and permitting the sand to settle out. The separator was designed by C. F. Schroeder, chief engineer.

Here's how Stanolind simplifies removal of babbitt linings

THE problem of removing the lower half of a split babbitt shaft lining can be simplified by following a method used at Stanolind Oil & Gas Co.'s LaRosa plant in South Texas.

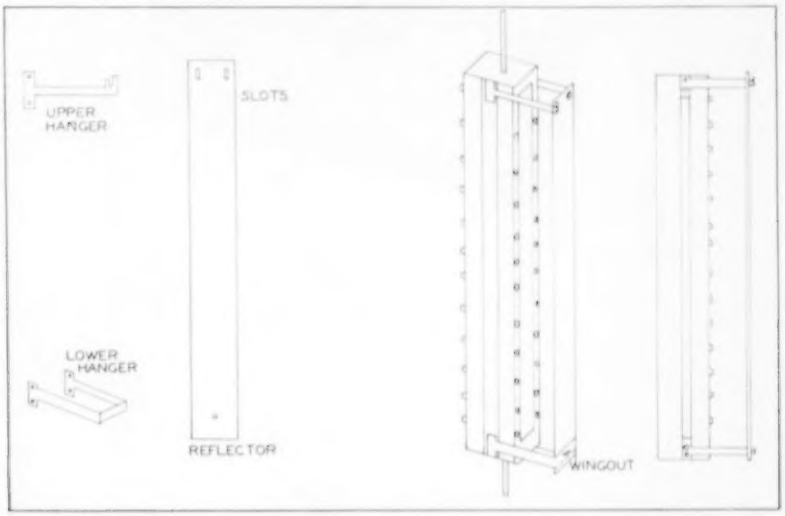
Once the shaft housing has been removed and the upper half of the babbitt shell pried off, a small bolt should be placed in the oil hole in the shaft. The bolt head should protrude slightly,


I
HOUSING AND BABBITT LINER IN PLACE
II
HOUSING AND UPPER HALF OF LINER REMOVED, BOLT INSERTED IN OIL HOLE ON SHAFT
III
SHAFT SLOWLY ROTATED SO THAT BOLT HEAD COMES UP ALONG EDGE OF LINER
IV
ROTATION OF SHAFT CONTINUED AS BOLT FORCES LINER OUT OF HOUSING

but not to such an extent that it will not clear the shaft housing when the shaft is rotated.

The shaft should then be slowly rotated so that the bolt head will come against the babbitt lining and force it around out of the housing as the shaft completes a revolution.

Replacing the new babbitt liner can usually be done without any difficulty.



Reflectors simplify tank-level checking

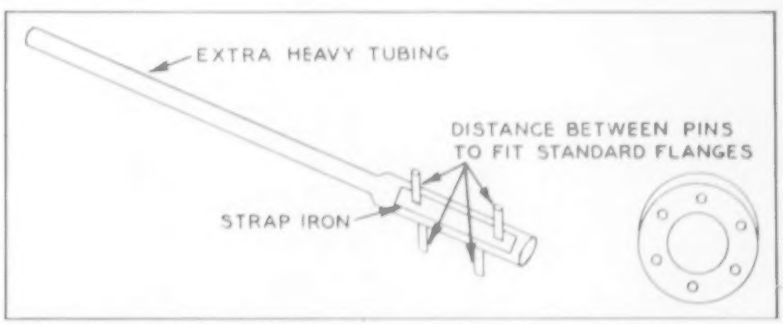
REFLECTORS mounted behind gage glasses may simplify checking liquid content of a tank or vessel.

Such an arrangement is especially helpful when an insulated vessel, such as an acid settler in an alkylation plant, provides a normally dark background.

The reflector is simply a rectangular piece of heavy-gage galvanized sheet iron, painted white or aluminum. This is supported by sheet-metal hangers bolted at the top and bottom of the gage-glass holder. The hangers are long enough to support the reflector about 3 in. from the rear of the gage glass.

The reflector has two slots near its top which permit it to slip over hooked ends of the two upper hangers. The lower part of the reflector is secured on the bottom hanger by means of a wing nut. This permits it to be removed easily for repainting or repairs to the gage glass.

Courtesy Sinclair Refining Co., Houston.



Use of this bar is preferable to wrenches in limited space.

This bar helps threaded-flange makeup

A BAR equipped with pins at one end is being used to make up threaded flanges at Stanolind Oil & Gas Co.'s LaRosa gasoline plant near Woodsboro, Tex.

The bar is a length of extra-heavy tubing which has been flattened at one end. A piece of strap iron was welded on each side of the flattened end, and two pins were welded to each of the strap iron pieces. These pins are spaced to accommodate two different sizes of flange, one on each side of the bar.

Use of the bar eliminates the difficulty experienced with wrenches in the limited space normally available with most threaded flanges. It is especially satisfactory with large size flanges.

Plant superintendent of the LaRosa installation is J. T. Corbett.

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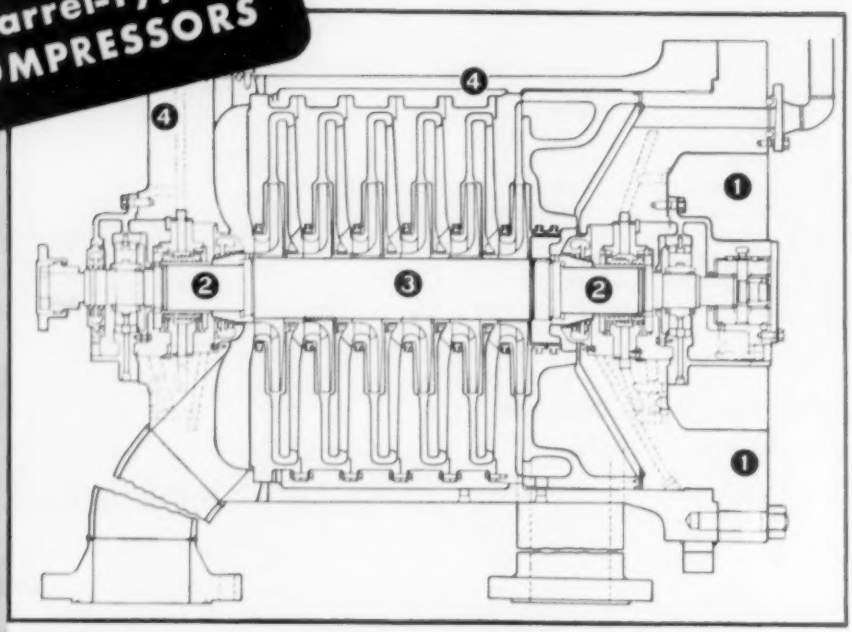

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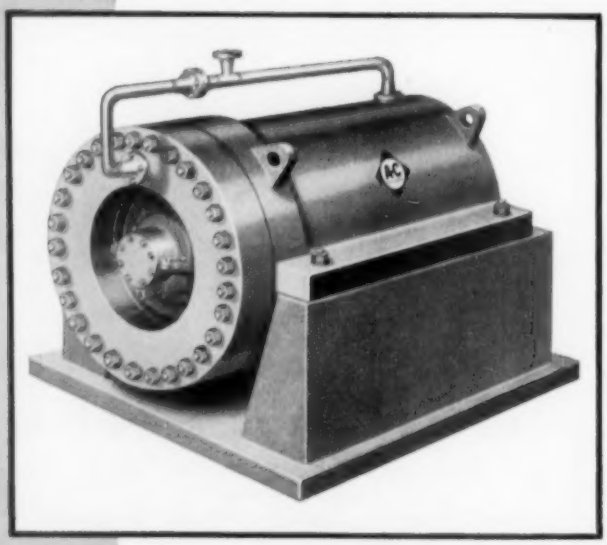

This compressor is typical of Allis-Chalmers high pressure barrel units for "upgrading" processes.

Above are a few of the features that make it easy for maintenance men to keep equipment on stream around the calendar. Details of this design are yours for the asking. Call your nearby A-C office or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wis.

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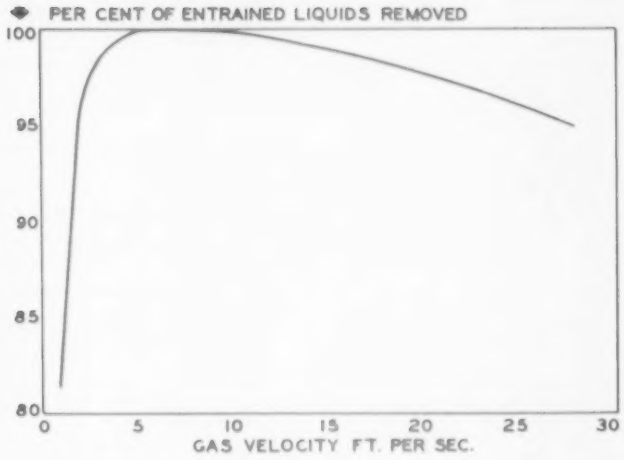
KNITTED-WIRE-MESH screen used for mist extraction in small vessels. Fig. 1.



EFFICIENCY of wire-mesh mist extractors as a function of gas velocity. Fig. 2.

Knitted-Wire Mist Extractors—and How They Work

They increase efficiency at low installation cost

by Dr. John M. Campbell

IN the last several years, increased use has been made of mist extractors composed of a knitted wire mesh supported on a lightweight support. This material has given generally favorable results and has a low installed cost.

The element consists of wire knitted into a pad having a number of unaligned asymmetrical openings. Although similar in appearance to filter media, its action is somewhat different. The latter are rather dense and have small openings. This knitted wire, on the other hand, has about 97 to 98 per cent free voids and collects the particles primarily by impingement.

The material is available in single wound units of varying thickness in diameters up to 36 in., or in laminated strips for insertion through manholes in large process vessels. A view of the former is shown in Fig. 1.

How it works . . . The principle of this separator is similar to that of the vane-type unit. The gas flowing through the pad is forced to change direction a number of times although centrifugal action is not so pronounced. Impingement is the primary mechanism.

A liquid particle striking the metal surface, which it does not "wet," flows downward where adjacent wires provide some capillary space. At these points liquid collects and continues to flow downward. Surface tension tends to hold these drops on the lower face of the pad until they are large enough for the downward force of gravity to exceed that of the upward gas velocity and surface tension.

Velocity determines efficiency . . . Fig. 2 illustrates data obtained by Carpenter[1] on an evaporator operating with a salt solution. Operating experience tends to confirm the shape of the curve.

The impingement efficiency falls off rapidly at low velocities for the droplets will tend to drift between the wire. At high velocities the elements tends to flood. Liquid cannot flow downward against the increased upward velocity forces and therefore accumulates. As the interstices become full of liquid a portion is reentrained and passes out with the overhead gas.

Throughout the proper operating range the following equation accurately represents the data shown in Fig. 2:

$$V = K\,[(\rho_L - \rho_G)/\rho_G]^{1/2} \qquad (1)$$

where:

V = allowable velocity at separator pressure and temperature, ft. per sec.
ρ_L = density of liquid droplets, lb. per cu. ft.
ρ_G = density of gas, lb. per cu. ft.
K = proportionality constant.

For the average unit, values of K vary from 0.12 to 0.43, depending on the service and the location of the unit.[5] The value of K is a function of the disengaging space available between the source of the entrainment and the bottom of the pad. For oil and gas separators a value for K of 0.35 has proved satisfactory.

Best designs . . . Equation 1 is similar in form to those proposed for determining the allowable velocity in separators, absorbers, fractionators, etc. In these cases though, the value of K normally varies from 0.12 to 0.17. Consequently, the cross-sectional area of the pad should sometimes be less than that of the vessel proper. This is easily accomplished by blanking off a portion of the supporting grid.

Langmuir and Blodgett[2] concluded from their studies on impingement that the efficiency is a function of the num-

Author is with the department of petroleum engineering, University of Oklahoma, Norman.

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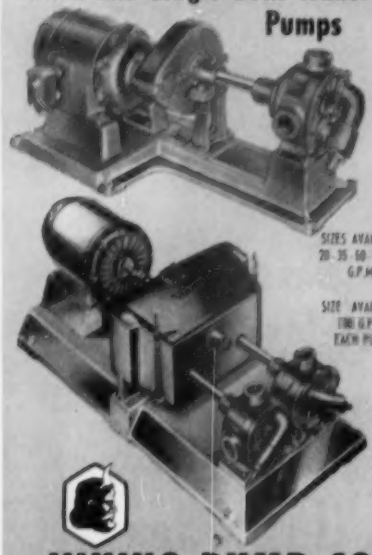

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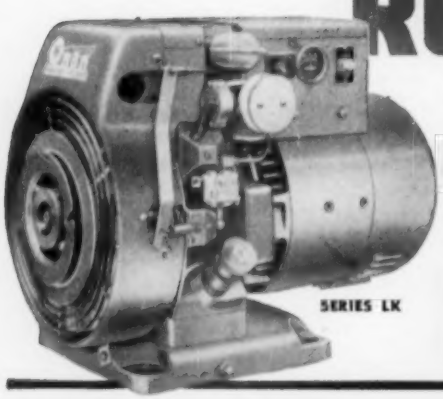

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ber of targets presented. This may be accomplished by increasing the pad thickness, changing wire diameter or the closeness of the weave.

The wire mesh normally used falls within the following range:

Wire diameter—0.003 to 0.011 in.
Void volume—92 to 99.4 per cent.
Density—3 to 33 lb. per cu. ft.
Surface area—50 to 600 sq. ft. per cu. ft.

The most commonly used wire has a void volume of 97 to 98 per cent, has a bulk density of approximately 12 lb. per cu. ft., a surface area of 110 to 125 sq. ft. per cu. ft., with a wire diameter of 0.011 in. A pad thickness of 4 to 6 in. is sufficient for most separator applications although thicknesses up to 3 ft. have been reported. In separator service, where the guarantee requiring that the entrainment shall not exceed 0.1 gal. per M.M.c.f., 4 to 6 in. will normally suffice.

Materials used . . . Any common metal may be used in these units, including carbon steel, stainless steel, aluminum, monel, etc. The pressure drop is a function of the entrainment load, the pad design, and gas velocity but will not exceed 1 in. of water in the average installation. Because of this small pressure the elements do not have to be "held down" and are normally only wired to the support grid to prevent shifting.

Experience has shown that the support grid should contain at least 90 per cent free area in order to eliminate any restrictions to liquid drainage. The pads are light in weight so that a light angle-iron support is adequate.

The cost of knitted wire mist extractors obviously varies with the type of pad, its thickness, and the materials used. When using 18-8 stainless, $9 to $10 per sq. ft. will cover about 75 per cent of the installations. Carbon steel units cost about 25 per cent as much.

When both liquid and solids are present a portion of the latter will obviously be scrubbed out. When only dry solids are present, the efficiency is substantially less although design modifications have been at least partially successful. At the present time though this type unit is considered primarily a liquid unit.

Bibliography

1. Carpenter, C. L., D.Ch.E. Thesis, Brooklyn Polytechnic Inst., (1951).
2. Langmuir, I., and Blodgett, K. B., Army Air Forces Tech. Report No. 5418 (1946).
3. Petr. Proc., 5, 719 (1950).
4. Reynolds, S. C., The Oil and Gas Journal, 52, 14, 117 (1953).
5. Stairmand, C. J., Inst. Chem. Engrs. (London), 28, 130 (1950).
6. York, O. H., Chem. Eng. Prog., 58, No. 8, 421 (1954).

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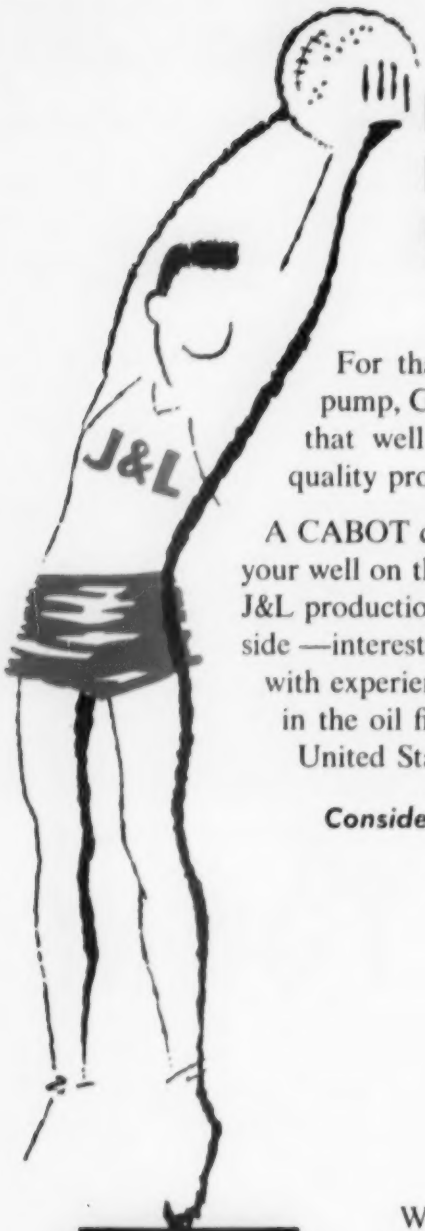

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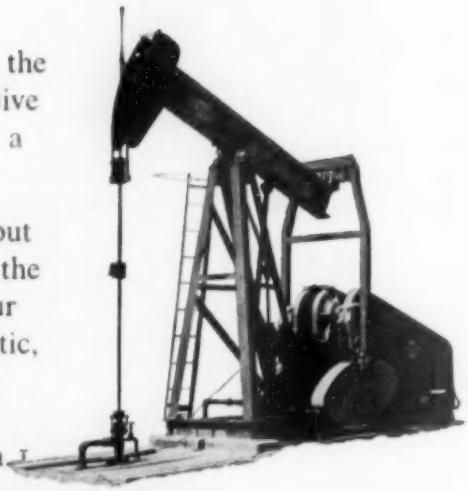

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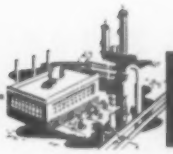


THE FOREMAN'S PAGE

Refining • Petrochem • Natural Gasoline

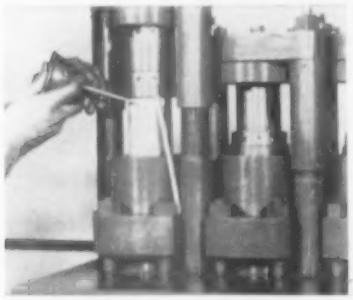
JOB IMPROVEMENT FOR THE PROCESS FOREMAN—44

How to Install and Maintain Power Pumps—4

28 When you unbolt the plunger crossheads from the side rods that connect them to the power end, use two wrenches as shown. This will take the strain off the side rods and plungers.

29 Don't tilt the plunger when you lift it out. Some pumps have tapped holes for eyebolts atop the plunger crossheads, so a hoist can be used. Otherwise, lift plungers out by hand.

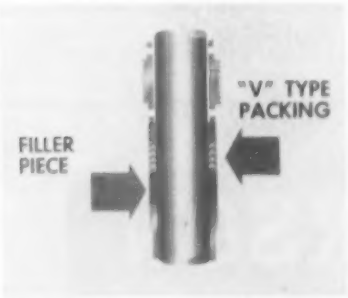
30 Next, unscrew the plunger gland and lift out the metal packing ring with draw rods supplied with pump fittings. The packing ring should always be installed above the top ring of packing.



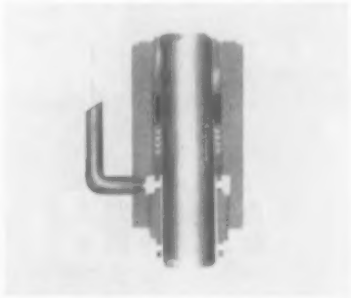
31 With split-ring packing, simply turn the pump over by hand until the plunger to be packed is at top dead center. Unscrew the gland, and, on vertical pumps, prop the gland and packing ring up with a stick. Oil the plunger surface.

32 Now insert the rings of packing one by one. Tamp each one down separately and firmly, but do not use a sharp tool! If split type packing is used, be sure to stagger the splits to get proper installation.

33 After the last ring is in place, lower the metal packing ring and then the gland. Pull the gland tight to compress the packing, then back it off until only finger tight. This will assure proper compression.



34 "V" type packing is self-sealing, and takes much fewer rings to hold the same pressure as square rings. "V" rings are self-sealing and the gland should always be kept just hand tight.



35 To adjust "V" packing correctly, remove one ring at a time until the box does run cool without excessive leakage. Remove rings to adjust for operating conditions.

36 When vertical plungers are removed, be very careful putting them back. Many pumps are provided with match marks on the plunger crossheads and side rods.

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IMPROVING DISTILLATE FUELS—5

The Effect of Additives on Gel Formation

by J. P. Kirchner, D. P. Osterhout, and W. R. Schwindeman

TWO tests for additive effects were discussed in the previous installment. Here are two other tests:

. . . 3. Emulsions and water haze. A sample of the fuel containing the additive is contacted with 10 per cent volume of water by vigorous mechanical shaking. The sample is allowed to settle for 24 hours, then the fuel, fuel-water interface, and water layers are observed for clarity and the presence of emulsion. The fuel layer is then siphoned off without disturbing the fuel-water interface or water layers. A fresh sample of the same fuel is added and the process repeated. This cycle is repeated 10 times to simulate the repeated filling of a storage tank over one season. The water may be fresh or of various pH depending on the field condition being simulated.

. . . 4. Water extraction and hydrolysis. These characteristics are best evaluated by subjecting fuel-additive blends to contacting with water, and then conducting the performance-type tests on the contacted sample to determine whether its properties are altered in any way.

The remaining tests for additive effects consist of running the more standard physical, chemical, and performance tests for distillate fuel.

Table 8 (Installment 4) lists the advantages and disadvantages of a number of distillate fuel oil additives. It will be noted that all of the additives listed show sediment inhibiting and/or antiscreen-clogging properties. However, only the first three additives listed are free from disadvantages.

Authors are with Socony Mobil Oil Co. at Paulsboro, N. J. From paper presented at A.S.M.E. Chicago meeting.

Now let's look at the last two subjects discussed in this series: Anti-gel additives and refining methods.

In addition to the evaluation of additives as oxidation inhibitors and antiscreen-clogging agents, development work was also conducted on additives which might be useful in controlling gel formation. One theory was that a chelating material which would combine with the copper ions entering the fuel might reduce their ability to react with the mercaptans to form gel.

This worked to some degree in laboratory tests on fuels from a particular crude source. But it proved to be ineffective in fuels from other crudes. Field tests with one fuel showed that this type of compound had substantially no effect on gel formation.

Many other commercially available and experimental additives have been tested to study their effect on the formation of gel. To date, only one material has shown evidence of being effective over a wide range of circumstances. This material is a mixture of two distillate-fuel additives which show a marked synergistic effect in eliminating gel formation. Data on these additive studies are shown in Table 9.

TABLE 9—EFFECT OF ADDITIVES ON GEL FORMATION

Additive—	Micrograms sulfur as mercaptan from test filter
None	200
"CH"[1]	50
None	500
"CH"	400
None	700
"CH"	275
None	700
"P"	50
None	500
"P"	40

[1]Chelating compound

Refining

In extreme cases, the storage stability of No. 2 fuel oil may be so poor that additional refining is required to eliminate or reduce the formation of the sediment that causes sludge. In most cases, refining is more expensive than additives. But there is a point where the use of additive alone in extremely unstable fuels is too costly. At this point, it becomes economically feasible to refine the fuel to improve its storage stability. However, there is no treating process that imparts antiscreen-clogging properties to the fuel and it is usually necessary to add an antiscreen-clogging additive to prevent trouble from sludge already present in the system.

Combination . . . Refining may also be used to good advantage in combination with sediment inhibitors. In some fuels, it alone will not appreciably reduce sediment formation. But when the treated fuel is inhibited, satisfactory sediment stability is achieved.

In addition to improving the storage stability of No. 2 fuel oil, refining is also the best remedy known for the mercaptide-gel problem. Most of the treating processes found to be effective in improving storage stability of cracked stocks also extract mercaptan sulfur compounds. Thus, in many cases, both the sludge problem and the gel problem can be eliminated by the same refining process.

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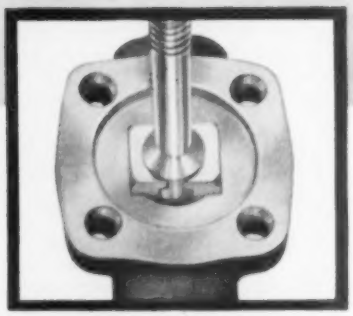

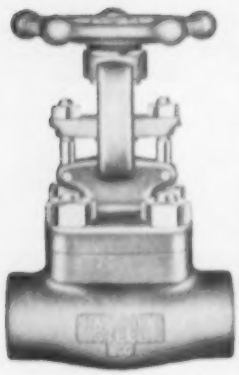

FULL GUIDING in the Type 950 Hancock Steel Gate Valve does not permit the wedge to gall, scuff, chip or wear the seating surfaces. Four accurately-machined grooves in the valve body guide the wedge to and from the seats and prevent wedge rotation. No matter how great the flow and pressure load or the rotating force exerted by turning the handwheel, the wedge corners do not hit or rub across the seating surfaces. This close-clearance guiding protects against seat damage that frequently causes other valves to leak in as few as one opening-and-closing operation at service pressures.

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8. Cost of Lumber and Lumber Construction

by W. L. Nelson
Technical Editor

LUMBER is such a commonplace construction material that it is often neglected by estimators. Nevertheless, timbers, scaffolding, temporary structures, cooling towers, etc., sometimes constitute a significant part of a cost estimate. The costs of some types of lumber and lumber construction are indicated in Table 1 and the cost of wood-treating or oil storage tanks is indicated in Table 3. Slightly higher tank costs[2] are obtained from the data of Table 1. The approximate amount of lumber required in the scaffolding used in insulating fractionating towers is indicated in Table 4.

The common basis for lumber costs is the "board foot" which is defined as 1 sq. ft. of material that is 1 in. thick, and the common unit is M.f.b.m. for 1,000 ft. board measure. Another common term is the "square" or 100 sq. ft.

The erection cost of wood tanks constitutes 40-60 per cent of the material cost for large tanks (2,000 f.b.m. or larger) and 60-100 per cent for small tanks or vessels.[2]

TABLE 2—LUMBER INDEXES (APPROXIMATE)[1,3]—1946 = 100

	Composite lumber	Southern pine	Other soft woods	Redwood heart, all clear*	Cypress, select C†	Wages, carpenters‡	Wages, refinery labor	Nelson Index†
1946	100	100	100	100	100	100	100	100.0
1947	155	139		126	155	118	113	117.0
1948	181	174	206	150	178	130	128	132.5
1949	165	158	204	163	213	131	137	135.7
1950	193	177	230	192	250	137	144	146.2
1951	208	189	253	202	256	147	152	157.2
1952	203	191	249	223	206	150	163	163.6
1953	201	190	256	229	208	159	174	173.5
1954	198	181	253	230	204	170	183	179.8
1955 est.	210	188	269	245	208	173	190	184.5

*1946 base price, $104.00 per M.b.f.m. †1946 base price, $99.10 per M.b.f.m. ‡Index based on New York wages ($2.10 in 1946). Average wage in 1946 was about $1.66 per hour.

TABLE 3—COST OF WOOD (REDWOOD) STOCK TANKS* (1946)[3]

Size—	Capacity (bbl.)	Cost† 2 in.	Cost† 2½ in.	Cost† 3 in.	Cost of moving— Reset	Cost of moving— Take down
16 by 8 ft.	250	$665	$885	$915	$82	$35
16 by 10 ft.	310	741	951	1,015	88	39
22 by 8 ft.	500	1,032	1,315	1,415	130	44
22 by 10 ft.	625	1,120	1,452	2,440	136	48

*West Texas prices. †Costs for three thicknesses of wall.

TABLE 1—COSTS OF SOME TYPES OF LUMBER CONSTRUCTION (1946)[1,2,4]

Lumber—	Unit	Material	Labor
Scaffolding:			
Towers, or above 20 ft.	$/M. f.b.m.	113	85
Pump houses, pipe stills, or below 20 ft.	$/M. f.b.m.	85-94	93-102
Forms for concrete:			
On ground	Cts./sq. ft.*	10*	26
Roof beams	Cts./sq. ft.*	23*	12
Walls	Cts./sq. ft.*	20*	11
Structural timber	$/M. f.b.m.	52	58-73
Framing	$/M. f.b.m.	82	40
Siding	$/M. f.b.m.	133	71
Shingles, red cedar	$/square	97	30
Tank stock:			
Oak	Cts./f.b.m.	56-75†	(‡)
Cypress	Cts./f.b.m.	53-74†	(‡)
Redwood	Cts./f.b.m.	47-63†	(‡)
Fir	Cts./f.b.m.	40-56†	(‡)
Pine, yellow	Cts./f.b.m.	24-50†	(‡)
Juniper (Virginia white cedar)	Cts./f.b.m.	24-45†	(‡)

*Each square foot of form requires much auxiliary framing. †Including hoops and hardware. Galvanized hoops cost 8 per cent more. ‡Erection cost, 40-60 per cent of material cost for large tanks (2,000 f.b.m. and larger) but 60-100 per cent for tanks under 500 f.b.m.

TABLE 4—APPROXIMATE SCAFFOLDING AND FRAMING PER DECK (1946)

Diameter—	f.b.m.
2 ft. 6 in.	178
5 ft. 0 in.	202
7 ft. 0 in.	252
10 ft. 0 in.	330
13 ft. 0 in.	402
16 ft. 0 in.	505
20 ft. 0 in.	550

References

1. Nelson, W. L., Lumber, The Oil and Gas Journal, Dec. 2, 1948, p. 115.
2. Bliss, H., Chem. Engineering, May 1947, p. 126.
3. Nelson, W. L., The Nelson Refinery Construction Cost Index, The Oil and Gas Journal, July 7, 1952, p. 105. (The Nelson Index also appears in the first issue each month of The Oil and Gas Journal.)
4. Author's files.
5. Anon., Wooden Tanks . . . , The Oil and Gas Journal, Mar. 16, 1943, p. 77.

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Pointers on Measuring Wet-Gas Streams—1

by L. G. Cable and J. E. Eskew, Jr.

THE over-all problem of gas measurement is highly complex because of the many variables involved. It becomes even more complex when we are confronted with the measurement of full-well-stream gas—which means, in the majority of cases, the measurement of high-pressure wet gas.

Correct measurement (within the limits of industrial practice) of full-well-stream gas or wet gas is made possible by orifice-meter measurement through conventional meter runs. Full-well-stream measurement in this manner presents some problems. Most common of these are:

1. Hydrates forming in the meter.
2. Liquid collection in the meter.
3. Pulsating flow.
4. Fluid condensing in the meter run and damming up in the upstream section of the meter run.
5. Obtaining correct wet-gas gravities.

Why measure? . . . The main reason for full-well-stream gas measurement is that (when combined with a g.p.m. test) it is the most economical way to measure both gas and liquid from a well—especially where several wells are producing into a centralized separator station or processing plant.

During the period of reservoir cycling, accurate or good wet-gas measurement was not of particular importance in some plants. This was true because all residue gas was injected into reservoirs that were being cycled, and the only actual gas disposed of was that used for fuel. But with the introduction of sales of large volumes of natural gas to transmission lines delivering gas to the northern and eastern parts of the country (and to industry moving to the areas of unlimited fuel supply), the necessity for accurate gas measurement became more important.

Measurement of well-stream gas has of course been satisfactorily accomplished. It is done by separating of gas and liquid at each individual well, metering each individually, and recombining the liquid and gas before going into the gathering system. The equipment necessary to do this results in a very expensive operation if several wells are involved.

Well head . . . In most cases, the measurement problem can be minimized or removed by installing the measurement equipment as near the well head as possible. The maximum temperature and pressure present at the well head can then be used to prevent the liquid dropout that ordinarilly occurs when pressure and temperature are decreased from well-head conditions. However, accurate wet gas gravity presents a special problem.

The ideal situation, from the standpoint of measurement, is one where the proper temperature and pressure exist at the point of measurement so that all liquid being metered is in the gaseous phase. The only point where these conditions could exist in a wet-gas gathering system is at the well head.

A typical well-head measurement installation is one where the meter run comes directly off the well head with no choking or restrictions upstream of the orifice fitting. All flow control or choking equipment in an installation of this kind would occur downstream of the meter run.

Some fluid at well head . . . With this ideal situation in mind, it would appear that if wet gas were metered at the well head, measurement would be no different from that conventional dry-gas measurement. This is frequently the case. However, anyone who has had experience with gas-well production and wet-gas measurement knows that in some cases (partially depleted gas wells, low deliverability wells that flow erratically, extremely high g.p.m. wells, and others) the ideal conditions of pressure and temperature do not always exist. Some liquid is produced as such at the well heads.

And therefore, the problems mentioned earlier that effect good wet-gas measurement must still be reckoned with.

In the next installment effect of hydrate formation will be dealt with, along with fluid in meter and pulsation.

Authors are with La Gloria Oil & Gas Co. Presented before N.G.A.A. southern regional meeting, Shreveport, La.

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Under Way, Contracted, and Planned

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by • preceding the job.

Crude-Oil Pipelines

Lakehead Pipe Line Co., Inc.—Company has let 51 miles of 26-in. line to Anderson Brothers Corp., Houston. The job is expected to be completed during the summer of 1956 and is in conjunction with 69 miles of 24 and 26-in. looping that Interprovincial Pipe Line Co. will also complete next summer (see Interprovincial under Canada, also).

• **Offshore Gathering Corp.**—This Houston company has proposed to build a natural-gas and a crude-oil line to gather gas and crude in the Gulf of Mexico off Louisiana. The gas line will be comprised of 60 miles of 24-in., 70 miles of 26-in., and 234 miles of 30-in. The crude line will be mostly 20-in. Each line will be about 364 miles in length. Estimated cost of the lines is $150,000,000.

• **Pasotex Pipe Line Co.**—Firm plans to lay 75 miles of 20-in. along its route from Wink to El Paso, retiring another dual 8-in. section.

• **Shannon Oil Co.**—This Denver firm, along with Farmers Union Central Exchange, Inc., and Mule Creek Oil Co., both of Billings, Mont., plan a 34-mile 6-in. from Murphy Dome in Hot Springs County, Wyoming, to contact Ohio Oil Co. line in Big Horn County.

• **Sinclair Pipe Line Co.**—Company will build a 300-mile crude line from Jacksboro, Tex., to Houston. The project will cost $14,000,000 and require 3 years to complete. The 150-mile portion from Jacksboro to Mexia will be 18-in. pipe. The Mexia-Houston portion will be 20-in. River Construction Corp. has Jacksboro to Mexia project.

• **Union Oil Co. of California.**—Company proposes to build an 815-mile line from Rifle, Colo., to Los Angeles to carry the products from its proposed Rifle, Colo., shale-oil plant to the Los Angeles refining area. The line would cost approximately $56,000,000.

• **U. S. Defense Department.**—Defense officials are considering a 97-mile, $8,000,000 line from the Elk Hills Naval Reserve in California to the Los Angeles refining area.

• **West Coast Pipeline Co.**—Proposed big-inch crude line from Wink, Tex., to Norwalk, Calif. Company has repeatedly sought federal aid to build line and has been turned down. Plans still in effect however.

Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area.

Cosden Petroleum Corp.—Company is building 100 miles of 6-in. line from its refinery at Big Spring to Abilene, Tex. C. O. Holder Construction Co., of Snyder, Tex., has contract.

• **El Paso Natural Gas Co.**—Firm has disclosed plans to build a 240-mile, "larger than 6-in." line from the Permian basin to El Paso. The line will start in the vicinity of the firm's Midkiff natural-gasoline plant in Midland County, Texas. The new line will carry natural gasoline, butane, and propane.

• **Gulf Refining Co.**—Firm will build a 45-mile, 8-in. products line from Pontiac Eastern Corp.'s planned refinery at Hattiesburg, Miss., to a connection with Plantation Pipe Line Co.'s system. The refinery isn't due on stream until May 1957, and no definite time has been set for start of laying the line.

• **Phillips Chemical Co.**—Firm plans a 50-mile, 4-in. ethylene line from Sweeny, Tex., to Port Adams, Tex. The estimated date of completion is set for October 1, 1956.

• **Phillips Pipe Line Co.**—Firm plans 64-mile, 12-in. products line from Sweeny to Houston. Completion set for April 1956.

Plantation Pipe Line Co.—Firm will spend $23,500,000 in 1956 to expand its system from Baton Rouge, La., to Greensboro, N. C. The company will lay 327 miles of 18-in. from Baton Rouge to just south of Birmingham at Helena, Ala. The new line will increase capacity from 245,000 bbl. daily to 304,000 bbl.

• **Sioux Oil Co.**—Firm plans to build 80-mile, 4½-in. line from its Newcastle, Wyo., refinery to Rapid City, S. D. The line is slated for completion in late 1956.

Southern Pacific Pipe Line Corp.—Firm has let an 87-mile, 6-in. products line from its main line at Phoenix to Davis Monathan Air Force Base. Engineers Limited Pipeline Co., of San Francisco has the job. Firm has also let a 76-mile, 6-in. project from near Phoenix to Luke Air Force Base. Hood Construction Co., of Lynwood, Calif., has the job. A 14-mile, 6-in. line from Colton, Calif., to March Air Fore Base will be let later.

• **Sun Pipe Line Co.**—Firm will build 110 miles of 14-in. from Twin Oaks, Pa., to Newark. The line will have a 83,000-bbl. capacity and will replace an existing 8-in. line. September 15, 1956, is expected completion date.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport L.P.G. from six counties in western Kansas to Wichita. Application approved by Kansas Corporation Commission.

• **Tennessee Gas Transmission Co.**—Firm has announced plans for a 200-mile butane line from its natural-gasoline plant west of Corpus Christi, Tex., to the Houston area. The butane will be sold to Petro-Tex Chemical Corp., which operates one of the nation's largest butadiene plants here.

Texas Eastern Transmission Corp.—Company has received Federal Power Commission approval to abandon the "Little Inch" gas line and to convert it to products service. The company will spend $13,000,000 converting the line back to products. When finished the line will have a capacity of 235,000 bbl. daily.

Non-Petroleum Pipelines

American Gilsonite Co.—Company has announced plans for a 100-mile pipeline from near Bonanza, Utah, to a proposed gilsonite refinery in western Colorado. The company, owned by Barber Oil Corp. and Standard Oil Co. of California, plans to make gasoline and coke by refining gilsonite. Gilsonite would be moved in a slurry.

Pittsburgh Consolidation Coal Co.—This firm has announced plans for the first pipeline to move coal. The line will be 108 miles of 10-in. from the company's Georgetown mines in eastern Ohio to Cleveland Electric Illuminating Co.'s Eastlake power plant northeast of Cleveland. Ford, Beacon & Davis, Inc., will issue specifications, let contracts, and supervise the construction work. Williams Brothers has contract and has shut down for the winter. Pipe will start about April 1.

Natural-Gas Pipelines

American Louisiana Pipe Line Co.—Company has let bulk of its 1,121-mile line from North Tepetate, La., to Detroit. Only a 22-in. spur from Payne, Ind., to Bridgman, Mich., is still not awarded. H. C. Price Co., Bartlesville, Okla., has 783 miles of 30-in. pipe. One section will work south from the Hancock-Henry County line and the other will work north from Slaughters, Ky. Brown & Root has 221 miles of 30-in. from North Tepetate to the Louisiana-Arkansas border, and 39 miles of 16-in. line to be built under water. The firm has subcontracted the 221 miles to Associated Pipe Line Contractors and Western Contractors. It will lay the under-water line itself.

• **Arkansas Louisiana Gas Co.**—Firm has announced long-range plans to build a $50,000,000 pipeline from the Texas-Louisiana coastal region to northern Louisiana. The line would connect with the company's present system.

• **Carolina Pipeline Co.**—This newly organized firm has applied to the South Carolina Public Service Commission for permission to distribute natural gas in central South Carolina. The firm plans to build $8,700,000 worth of distribution lines to 14 cities. Other towns in the area without natural-gas service may be included eventually. The new firm plans to buy gas from either Transcontinental Gas Pipeline Co. or Southern Natural Gas Co.

• **Carolina Natural Gas Corp.**—185 miles 8-12-in., proposed lateral lines off Transcontinental in North and South Carolina.

Cascade Natural Gas Co.—Firm has let contract to Engineering Construction Co., of Tulsa, for 400 miles of gas distribution lines in the State of Washington. The lines will range from ⅝ to 12-in. and will be laid in the towns of Yakima, Grandview, Granger, Prosper, Sunnyside, Toppenish, Union Gap, Wahpato, and Zillah. Work will start April 1.

• **Cities of Clarendon and Marvell, Ark.**—Cities have filed for FPC permission to interconnect their facilities with Texas Gas Corp.'s line south of Helena, Ark. The cities will build 53 miles of 4, 5, and 6-in. line to transport the gas.

• **Coastal Transmission Corp.**—Has applied to FPC for permit to lay 565 miles of 22 and 26-in. from McAllen, Tex., to Baton Rouge where it would deliver to Houston Texas Gas & Oil Co.'s proposed line to Florida. Coastal also plans 272 miles of smaller gathering lines.

• **Colonial Natural Gas Corp.**—Company proposes to build two systems, one from the Houston-Lake Charles area to Miami, Fla., and the other in the Carolinas and Georgia. Neither idea is before the FPC yet.

• **Colorado Interstate Gas Co.**—Firm completed 136 miles of 22-in. from Laramie, Wyo., to Denver in November. Second part of line from Laramie to Rock Springs, Wyo., will be laid in 1956. The second section will

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Pipeline Patrol

be 238 miles of 22-in. pipe and will be completed about October 1.

Company also proposes a 500-mile line from Laramie, Wyo. to Beatrice, Neb. to deliver 350 M.M.c.f.d. to Natural Gas Pipeline Co. of America. Size not disclosed.

• **El Paso Natural Gas Co.**—Firm has received FPC permission to loop 450 miles of 34-in. line from the San Juan basin to the Colorado River at the Arizona-California border.

• **Houston Texas Gas & Oil Co.**—Company has applied to FPC for permission to lay a 960-mile gas line between Baton Rouge and Miami. The main line would consist of 507 miles of 30-in., 157 miles of 26-in., 61 miles of 20-in., 224 miles of 18-in., and 12 miles of 12-in. Company also plans 500 miles of sales laterals in Florida. Main line would join with Coastal Transmission's proposed line from McAllen to Baton Rouge.

• **Iron Ranges Natural Gas Co.**—This St. Paul company has filed an application with the FPC to build a 68-mile transmission line and 47 miles of laterals to supply various towns and cities on the Mesabi Iron Range in Minnesota.

• **Lone Star Gas Co.**—Company has two plans up before FPC to enlarge its system in Texas and Oklahoma. One is for an $18,000,000, 230-mile line from Cotton County, Oklahoma, to Fritch, Tex. The other plan is for a 205-mile line from Snyder, Tex., to a hookup with the Cotton-Fritch line. The company hopes to prevent Natural Gas Pipeline Co. of America from building its line from Wise County, Texas, to Fritch (see below).

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Wisconsin.

• **Midwestern Gas Transmission Co.**—Company will build a main line from Portland, Tenn., to Canadian border near Emerson, Man., Canada. Extensions from main line to cities in Minnesota and Wisconsin are also planned. The main line will be comprised of 829 miles of 24-in., 109 miles of 16-in., and 174 miles of 12-in. The extensions will total 648 miles of 3 to 18-in. pipe. The application is now pending with the FPC.

• **Natural Gas Pipeline Co. of America.**—Company has FPC examiner's approval to build 350 miles of 20 and 26-in. line from Jack and Wise counties in North Texas to Fritch, Tex., near Borger. Approval and its conditions will be contested by both Natural Gas Pipeline and Lone Star Gas Co.

Company has also proposed 389 miles of 36-in. loop along its line from Beatrice, Neb. to Chicago to take gas from a proposed line of Colorado Interstate Gas Co. In addition, another 91 miles of 30-in. loop would be laid along other parts of Natural's main line.

Nevada Natural Gas Co.—Company plans looping program along its 114-mile line from Needles, Calif., to Las Vegas, Nev. Mileage and size are unknown but cost will be about $2,500,000.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia to Narrows and Dublin, Va.

• **North Carolina Natural Gas Corp.**—This subsidiary of Colonial Natural Gas Corp. (formerly Texas-Ohio Gas Co.) has received permission from the North Carolina Utilities Commission to build 575 miles of gas lines in the state. The system will range in size from 3 to 16-in. and will cost about $13,000,000. The line will run from a point on Transcontinental Gas Pipe Line Corp.'s system near Mooresville, eastwardly across North Carolina. It will deliver gas to customers in a

Pipeline Patrol

territory lying east of Charlotte and south of Lexington, Sanford, and Raleigh.

• **Northern Natural Gas Co.**—Company plans to spend $32,000,000 to add 348 miles of main line and 307 miles of branch lines in Wisconsin, Minnesota, South Dakota, and Iowa. The application is before the FPC now. The main lines include 169 miles in the Duluth-Superior area and 164 miles in the Aberdeen area of South Dakota.

• **Pacific Gas & Electric Co.**—Company's long-range plans call for looping the Topock-Milpitas line with 135 miles of 34-in. The major part of the line will be laid in 1956, while 62 miles will be laid in 1957.

Pacific Northwest Pipe Line Corp.—Over 700 miles of trunk line has been completed and firm has let contracts on remainder of job, 760 miles of trunk and sales laterals. Contractors are:

A. P. V. Co., Inc., 81 miles 26-in. between Plymouth and Goldendale, Wash.

Engineers Limited, Inc., 56 miles 26-in. between Goldendale and Stevenson, Wash.

Midwestern Constructors, Inc., 79 miles 26-in. between Stevenson and Toledo, Wash.

River Construction Corp., 64 miles 26-in. between Toledo and Tacoma; also 16 miles of 18-in. out of Portland, Ore.

B & M Construction Co., 53 miles 26-in. between Tacoma and Duvall, Wash.

Curtis Construction Co., 87 miles 26-in. between Duvall and Sumas, Wash.

Hood Construction Co., 31 miles 6-in. near Walla Walla, Wash.

R. H. Fulton & Co., 156 miles 20 and 16-in. lateral from main line to Spokane; also 129 miles of laterals into Idaho.

Eastern Pipeline Construction Co., 137 miles 10, 8, and 6-in. lateral to Yakima and Wenatchee.

H. B. Zachry Co., San Antonio, has contract for 42 miles of 4 to 16-in. line in the San Juan basin area of New Mexico. Pipe laying began in January.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Gloucester, Mass., area to Bangor, Me.

Pioneer Natural Gas Co.—R. H. Fulton & Co., Lubbock, Tex., has started construction on 56 miles of line for this company near Lamesa, Tex. Twenty-eight miles of 22-in. and 28 miles of 10-in. make up the job.

Portland Gas & Coke Co.—United Engineers & Constructors, Inc., of Philadelphia, has engineering contract for 80 miles of various size lines up to 16-in. for this Portland, Ore., firm. River Construction Corp. is winding up work on a 16-in. river crossing of the Willamette River for the company.

Private Interests.—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design, estimated the line would cost $20,000,000, although later figures have been much higher than this.

• **Southern California Gas Co.** and **Southern Counties Gas Co. of California.**—Firms have plans for three separate jobs. First is 19 miles of 30-in. from Placentia to Compton, Calif. Completion set for November 1956. Second job is 70 miles of 30-in. from Palmdale to Alhambra, Calif., and completion is slated for November, too. Third job is 210 miles of 30-in. from Topock to Palmdale. Last job not expected to be finished before April 1957.

• **Southern Natural Gas Co.**—Company has temporary FPC authority to build 39 miles of loop lines and add 4,950 hp. to its compressor power near Atlanta, Ga. Job will cost about $2,000,000.

Tennessee Gas Transmission Co.—The firm

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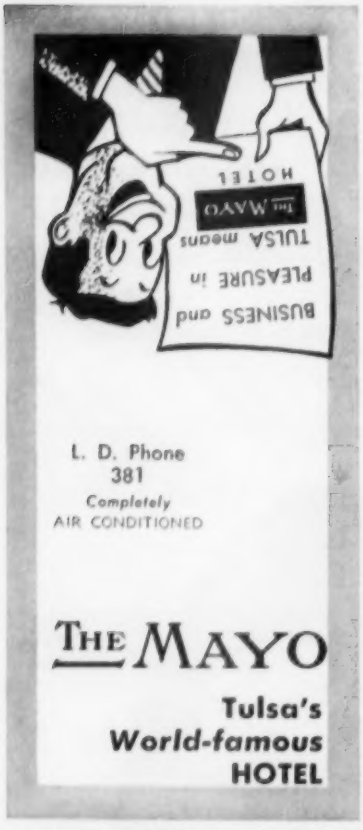

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PIPE LINE SURVEYS

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has the following projects under way or planned.

Project 1—370 miles of 30-in. line from Agua Dulce, Tex., to Kinder, La. Contractors are Morrison Constructors, Inc.; Williams Bros.; Houston Contracting Co.; H. C. Price Co.; Western Constructors; N. A. Saigh Co.; Panama-Williams Co.; and Associated Pipe Line Constructors, Inc. Completed.

Project 2—250 miles of 24-in. from Coudersport, Pa., to Greenwich, Conn. Contractors are H. C. Price, Bechtel Corp., and Pentzien, Inc. Completed.

Project 3—147 miles of 26-in. and 74 miles of 30-in. Thirty runs from Cave City, Ky., to Danville, Ky. Twenty-six-inch runs from a point north of the Ohio River to McConnellsville, Ohio, and from Newcomerstown, to near Lisbon, Ohio. Approved by FPC but not yet contracted. Completion set for fall of 1956.

Project 4—192 miles of 24-in., 34 miles of 20-in., 15 miles of 18-in., and approximately 110 miles of 4, 6, 8, 10, and 12-in. from point west of Crowley, La., looping the Bayou Sale gathering line for a distance of 74 miles to a point near the mouth of the Mississippi River. Houston Contracting Co. has about 162 miles of this, including 82 miles of 24-in. east of Jeanerette toward Leeville. Job includes 137 miles of marine work. Pipelaying started February 15.

Project 5—63 miles of 30-in. and 99 miles of 26-in. Thirty-inch will run from Scottsville, Ky., to Cave City, Ky., and from point southwest of Danville, Ky., to a point northeast of Danville. Twenty-six-inch will run from near Greenup, Ky., to just north of the Ohio River; from McConnellsville to near Newcomerstown and from Lisbon to Mercer, Pa. Application pending with FPC.

Project 6—Approximately 100 miles of 4, 6, 8, 10, and 12-in. gathering lines in the Gulf Coast area of Texas and Louisiana. Application pending with FPC.

(For news of a Tennessee subsidiary see Midwestern Gas Transmission Co.)

Texas Eastern Transmission Co.—Company has received FPC permission to begin converting its Little Inch line from natural gas to products service.

Company asked the FPC late in December 1955 for permission to build a 422-mile, 30-in. line from McAllen to Beaumont, Tex. The line would be used to transport imported Mexican gas. The firm also asked the FPC for permission to loop 530 miles of its 30-in. line from Kosciusko, Miss., to Uniontown, Pa. The company will also lay 45 miles of 24-in. from Provident City, Tex., to connect in Matagorda County, Texas. This would tie the Wilcox Trend Gathering System in with the extension from Mexico. The company will add 50,000 hp. in new compressor capacity and enlarge existing stations by 20,780 hp.

• **Texas Gas Transmission Corp.**—Company has received authority from a FPC examiner to build a 105-mile supply line extending from East Lake Palourde Gas field in Assumption Parish, Louisiana, to its system in Arkansas, Mississippi, Tennessee, Kentucky, and Indiana. The lines and additional compressor facilities totaling 19,190 hp. will cost about $20,000,000.

• **Transcontinental Gas Pipe Line Corp.**—Company has announced plans for a $35-$50-million expansion this year. Exact plans haven't been announced yet.

Has FPC permit to lay 24 miles of line to gather gas from South Bayou Mallet, Maxie, and Happytown fields of Louisiana at cost of $754,000.

Will also lay 12 miles of 16-in. to gather gas from Live Oak field in Vermilion Parish, Louisiana.

• **Trunkline Gas Co.**—Firm has applied to FPC for authority to build eight new compressor stations and 24 miles of pipeline on its transmission system to enable it to sell additional gas to Panhandle Eastern Pipe Line Co. Total capacity of the new stations would be 56,000 hp. Total cost would be $18,700,000, including $1,000,000 for gathering facilities in the Gulf Coast area. Panhandle filed for 1,600 hp. additional compressor capacity to cost $3,714,000.

• **United Gas Pipe Line Co.**—Firm has received Federal Power Commission authority to construct 105 miles of pipeline in Mississippi, Alabama, Georgia, and Florida. The company will also add 5,300 hp. in compressor capacity. The job will cost about $12,500,000.

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not yet let.

Foreign Crude-Oil Pipelines

Arabian American Oil Co.—Firm is building a 150-mile, 21-in. line from Safaniya field to near the Neutral Zone border.

• **Cremona Pipe Line Co.**—Firm has announced plans for a 60-mile crude-oil line from the Westward Ho-Sundre area to Calgary.

• **Esso, A. G.**—West Germany affiliate of Standard Oil Co. (N.J.) plans line from North Sea port to Rhur-Rhine area. This will probably be 120-mile, 10-in. from Rotterdam to Cologne, the latter rumored as the site of a new 58,000-bbl. refinery to be built by the company.

Ganso Azul Cia de Petroleo.—Company is building a 47-mile, 4-in. line from Agua Caliente field to Pucallpa, a port on the Ucayali River.

• **Gulf Italia Co.**—Firm is laying a 35-mile line from its Ragusa field in southwestern Sicily to a refinery at Augusta operated by RASIOM, an Italian company. The line size was not disclosed. Work is expected to be completed by the end of summer.

Interprovincial Pipe Line Co.—Majestic Contractors, Ltd., has contract for 67 miles of 24-in. and 2 miles of 26-in. along the company's system from Alberta to Sarnia, Ont. The Majestic work will be between Carroll and Somerset, Man., and 2 miles between the U. S. border and the Gretna pumping station. Work will be completed near the end of summer 1956.

• **Iraq Petroleum Co., Ltd.**—Company is making plans to lay a 75-mile, 24-in. products line from Homs, Syria, to Tripoli, Lebanon. The line would have a capacity of 180,000 bbl. daily.

• **Pembina Pipe Lines, Ltd.**—Company has announced proposal to build crude-oil line from Sundre-Westward Ho area of Alberta into Edmonton. Two other companies, Cremona Pipe Line Co. and Rangeland Pipeline Co. also have plans for moving the area's crude.

• **Rangeland Pipe Line Co.**—Subsidiary of Hudson's Bay Oil & Gas Co. has made proposal to build line out of Sundre-Westward Ho area to connect with a line of Texaco Exploration Co. and then go to connections with Trans Mountain and Interprovincial.

• **Sinclair Oil Corp.**—Company is considering a 240-mile crude-oil line from its San Silvestre field in the state of Barinas, Venezuela, to Puerto Cabello on the Caribbean Sea coast. The line would cost $25,000,000.

• **Standard - Vacuum Oil Co.**—Company has long-range plans for a 90-mile pipeline to give the new Lirik field in Cntral Sumatra an outlet. Completion is not scheduled before 1957 to 1958.

Westspur Pipe Line Co.—Firm has awarded contract to Majestic Contractors, Ltd., Edmonton, for 109 miles of 12-in. line from Midvale, Saskatchewan, to Interprovincial Pipe Line Co.'s pump station at Cromer, Manitoba. West spur has also let contract to

Pipeline Patrol

same company for 50 miles of various size gathering lines in the Midale-Frobisher area of Saskatchewan.

Foreign Products Pipelines

• **Chaco Pipeline & Refinery Corp.**—Firm plans to build 450-mile line from Glen McCarthy's wells in Bolivia to a new refinery to be built at Concepcion, Paraguay.

• **National Fuel Oil Co.**—This company in Israel is a shareholder in a company which plans to build a products line between Haifa and Tel Aviv. The plans call for a 55-mile 6-in. line in which the Government would own 10 per cent.

• **National Iranian Oil Co.** — Company plans $32,300,000, 573-mile, 10-in. products pipeline from Ahwaz to Teheran, Iran. The line will have a capacity of 40,000 bbl. daily. Constain-John Brown, Ltd., London and Williams Brothers Co., Tulsa have southern 337 miles and pipelaying started in February. Entrepose of Paris has the northern 236 miles.

• **North Atlantic Treaty Organization (NATO).**—Laying products lines to airfields in various parts of Europe. About 2,000 miles of line will be laid. Bids were taken in January on 300 miles of 12-in. line between Marseille and Langres, France. Cost will be about $7,850,000.

NATO—Associated Pipeline Contractors, Inc., Houston, is laying 450 miles of products line from Iskenderun, Turkey, to Batman, also in Turkey.

Overland Pipeline Corp.—This South African firm has requested government permission to build a 350-mile line, to cost $8,450,000 from the South African coast to Rand, a plateau area in southern Transvaal where there is heavy petroleum consumption.

The United States Defense Department.—Department is sponsoring a 485-mile, 8, 10, 12-in. products line from Cadiz to Zaragoza, Spain. The contract has been let to Merritt Chapman & Scott; Benson & Montin of Oklahoma City; and Agroman Construction Co., a Spanish firm. Brown-Raymond-Walsh is the prime contractor. Cost of the line will be approximately $5,000,000.

Winnipeg & Central Gas Co.—Canadian company plans to build a $20 million butane-propane system. Company plans to get gas L.P.G. from Signal Oil & Gas Co.'s Tioga, N. D., plant and move it to Winnipeg. Size and route of the line has not been definitely established.

Foreign Natural-Gas Pipelines

• **Alberta Gas Trunk Line Co.**—Company will spend $47,000,000 to build 547 miles of gas-gathering system for the Trans-Canada line. The 1956 stage of construction will total 219 miles and cost $22,650,000. The first part would start near Saskatchewan and include Pincher Junction, Provost, Bindloss, Sibbald, Oyen, Sunnynook, Steveville, and Cessford. The second part to be built in 1957 will consist of 328 miles and cost $24,400,000. The second phase will include Countess, Duchess, Princess, Homglen-Rimbey, and Nevis.

Attock Oil Co.—Company plans to build 60-mile natural gas pipeline from Dhulian field to Rawalpindi in West Pakistan.

Cia. Shell de Vanezuela. — Company has announced plans for a $21,000,000, 177-mile, 20-in. natural-gas line from La Paz field in the Maracaibo district to the Cardon refinery on Paraguana Peninsula. The gas will be used as the chief fuel in the refiner's furnaces. The line is expected to go into operation in 1957.

• **Empresa Nacional del Petroleo.**—80 miles, 10-in., planned, Concon to Santiago, Chile.

Imperial Oil, Ltd. — This Canadian firm has let contract for 65 miles of 4 to 16-in. gas-gathering system in the Redwater area of Alberta.

• **Magna Pipeline Co.**—Firm has plans to build a $6,000,000 underwater line from Anacortes or Bellingham in Washington to Victoria. The line is expected to be completed by the fall of this year.

North Canadian Oils, Ltd. — Dutton-Williams Brothers, Ltd., of Edmonton, has contract for 136 miles of 10-in. line from Wabumun to Hinton, Alta. Mid-Western Industrial Gas, Ltd., which will supply gas along with North Canadian to a pulp mill at Hinton, will build a line from its gas fields in the Alexander, Majeka Lake, and Westlock districts to Wabumum.

Clearing has started and pipe will start about May 1. Crossings of the McCleod River, Pembina River, and Wolf Creek are being made early.

South Alberta Pipe Line, Ltd.—Company has filed permit to construct a 150-mile, 8-in natural-gas line from Etzikom field to serve a nitrochemical plant to be built near Medicine Hat, Alta. The line will cost about $1,000,000.

• **Trans-Canada Pipe Lines, Ltd.**—Firm has about completed financing arrangements for a 2,250-mile natural-gas line from Alberta to Toronto and Montreal. The Ontario government has agreed to help finance the line through its province. Tennessee Gas Transmission Co. has proposed a line to take gas from the company at Emerson, Man. (See Midwestern Gas Transmission Co.)

Westcoast Transmission Co., Ltd. — Company is starting work on a 650-mile, 30-in. line from the Peace River area in Canada to Sumas, Wash. Contractors are Mannix, Ltd., Canadian Bechtel, Ltd., R. A. Conyes Construction Co., and Dutton-Williams Brothers Co., Ltd. Clearing has started.

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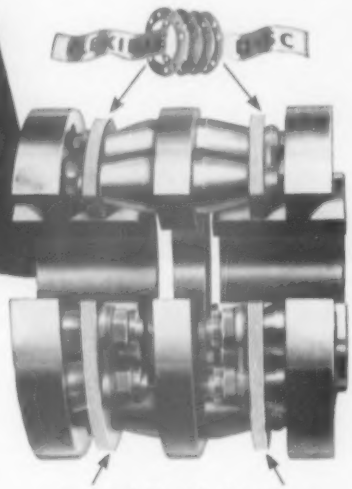

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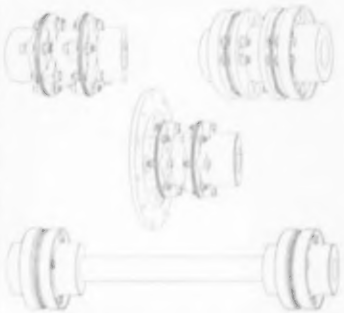

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Among the Drilling Contractors

LeCuno Company Operates Former Dan Lester Rigs

The company formerly operated as Dan Lester, Drilling Contractor, with headquarters at Jefferson, Tex., has been incorporated into LeCuno Oil Corp., also of Jefferson.

Lester is president of LeCuno. Associated with him are Leonard Culbertson, vice president; and A. W. Moore, secretary-treasurer. LeCuno is operating Lester's two drilling rigs for its own account. It also is buying another rig for shallow drilling and deep workover operations.

Present rigs include a Wilson Titan and a Wilson Giant.

H. L. Rowley, Inc., Shreveport, is scheduled for a 4,000-ft. Paluxy test to be drilled for California Co. at 1-4 Sondheimer, in 2-17n-11e, about 4 miles north of Quebec, in Madison Parish, northern Louisiana.

R. P. Phillips has a new contract operation scheduled at Bayou Boullion, in St. Martin Parish, Louisiana. It is a Discorbis test for H. L. Hawkins at 1 Schwing, in 29-9s-9e.

Miller & York, Bakersfield, Calif., will drill a deep test in the shallow McDonald Anticline field, 16 miles northwest of McKittrick, in Kern County, southern California. It is a contract job for Glenn C. Ferguson and I. W. Bosworth at 23 Layman, in 18-28-20. Drilling is set up to go to 7,500 ft. for a look at Eocene sands. The operators also are starting two shallow-sand tests, one to 1,650 ft. and the other to 2,100 ft.

Wichita Drilling Company Reorganizes Ownership

J. A. Mull, Jr., president of Purcell-Mull Drilling Co., Inc., Wichita, and others have acquired all stock and interest of Frank H. Purcell, Mull's partner, in the company.

Name of the company will be changed to Mull Drilling Co., Inc. Mull will remain president and general manager.

Moran Brothers Drilling Co., Wichita Falls, Tex., is drilling on a deep exploratory test in Hugoton gas field. It is a contract operation for Republic Natural Gas Co. at 1 Hanke, in 6-35-36, 11 miles southeast of Hugoton, in Stevens County, southwestern Kansas. Objective is Morrow sand about 6,000 ft.

Offshore Co., Baton Rouge, La., has contracted for two more deep offshore tests, one to be drilled for Shell Oil Co., and the other for Phillips Petroleum Co. Both are in Eugene Island area, in the Gulf of Mexico, off the coast of St. Mary Parish, Louisiana. Shell's operation is a rank wildcat more

Daylight and evening-tour crews on a rig Hose-Austin Drilling Corp., Casper, Wyo., has been operating in eastern Rosebud County, eastern Montana. Standing, left to right: Ed Anders, daylight driller; Ray Vallie, derrickman; Jerry Quinlan, engineman; and Emory Johnson, and Billy Hose, floormen. Front row, same order: Tom Knight, evening driller; Jim Dyson, derrickman; Bob Rogers, engineman; and Roger Nyberg, floorman.

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than 40 miles from shore in Block 188. The Phillips job, in Block 129-A, is near Eugene Island Block 128 field, about 20 miles northwest of Shell's wildcat, but also about 40 miles from land. Each is scheduled for 13,000 ft.

Troy Brown is keeping a rig working for Trice Production in development of sands to 4,000 ft. on the east flank of the old Lockport field, southwest of Lake Charles, in Calcasieu Parish, southwestern Louisiana. Latest operation is at 1 Olin-Mathieson, in 10-10s-9w. It is the operator's third test in the area.

Green & Heiser Drilling Co., Davis & Thompson Drilling Co., both of Bakersfield, Calif., and **Newton Drilling Co.,** Coalinga, Calif., are contractors on three new operations The Texas Co. is starting in San Luis Obispo County, California. Green & Heiser is on a 6,500-ft. test at 2 Richards, in the North Arvin area. Davis & Thompson has a outpost test, north of production at Fruitvale. Newton will drill a 5,000-ft. test in the Camatta ranch area.

Rimrock Tidelands, Inc., Shreveport, is drilling for California Co. at a wildcat location 4 miles south of Quebec, in Madison Parish, northeastern Louisiana. It is a 6,000-ft. Paluxy test at 1-3 Singer, in 14-16n-11e. Location is about 11 miles northeast of Lamar field, in Franklin Parish, nearest production.

Vasser Drilling Co., Natchez, Miss., is contractor on another test J. M. McLemore, of Lafayette, La., is starting in the Flatwoods area, Rapides Parish, Central Louisiana. It is the operator's third test to confirm a Wilcox oil discovery made in 1945. The discovery well, the only producer, has the pay at 6,500 ft. The new operation, 5-A Bentley Trust 2, is 650 ft. north of the discovery well.

Jack Halbert Drilling Co. is contracting a 5,100-ft. Woodbine test for Oil Properties, Inc., of Dallas, at a wildcat location, 1 Brightwell & Townley, in the Jose Pineda Survey, 3½ miles northeast of Jacksonville, in Cherokee County, East Texas.

Hoover Drilling Co. and **Gene Reid Drilling, Inc.,** both of Bakersfield, Calif., are the contractors in a new 10-well development program Honolulu Oil Corp. is launching for the Antelope horizon in Buena Vista Hills field, 4 miles northeast of Taft in western Kern County, California. Each contractor will drill five wells, using one rig each.

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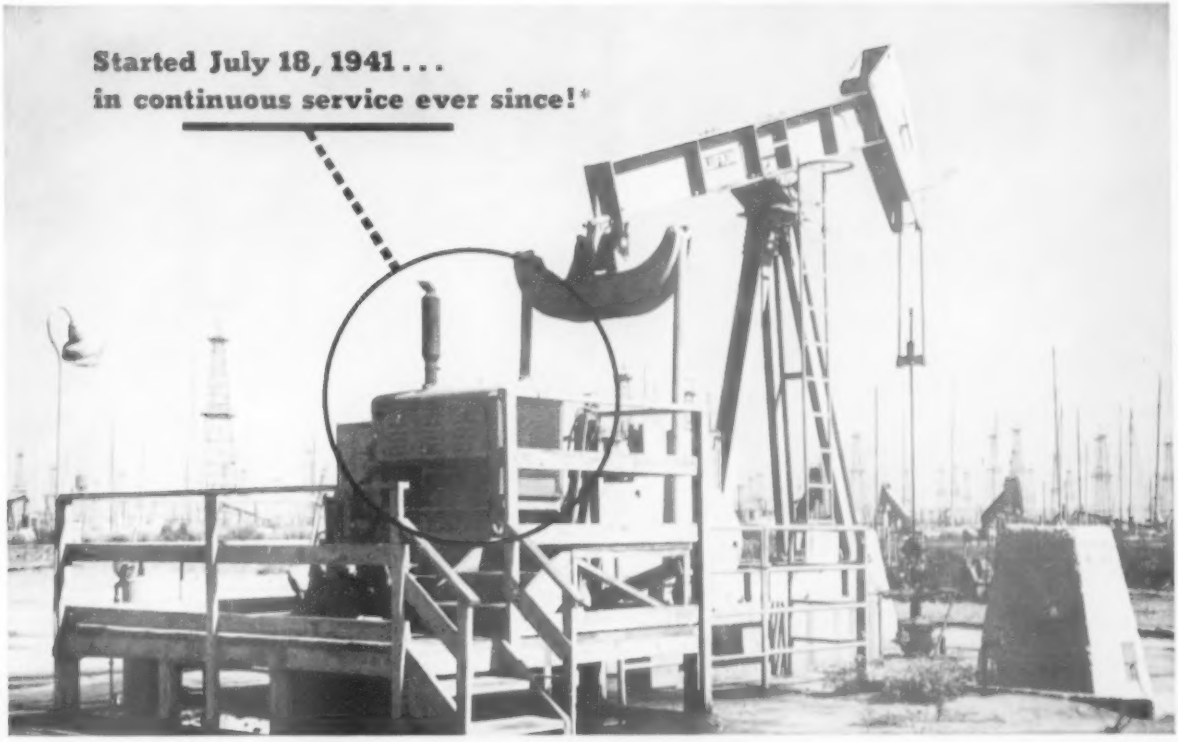

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CASE HISTORY SHOWS 108,000 HOURS FOR

LONG-RUN NATURAL GAS ENGINE

Oil field pumping installations like this make long-run Minneapolis-Moline engines pay as no other power can!

*Installed and operating July 18, 1941, this MM Model HUA natural gas engine remained in continuous pumping service without repair until May, 1952, when it was removed from the well for changing other equipment. Although the engine was operating satisfactorily, the field superintendent felt that this opportunity should be used to go over the engine due to its long service. Examination of all parts showed that the engine would have run years longer without attention. For example, micrometer measurements showed main bearing shells worn only .001-inch and connecting rod bearings worn only .0005-inch after 86,359 hours of operation. A copy of the full service report is available on request.

The HUA was rebored, fitted with new pistons and piston pins and returned to service. It has remained in pumping service ever since, logging a total of 108,000 hours of operation.

While the operating record made by this veteran MM power unit is one of the longest yet reported, many long-run improvements have since been added to MM engines. These improvements, some of which are illustrated below, make possible far longer performance on continuous-duty jobs. Discover the big, two-way savings you can make with long-run MM engines, in low installation cost, and in long years of maintenance-free operation. Contact your MM oil field distributor for the facts.

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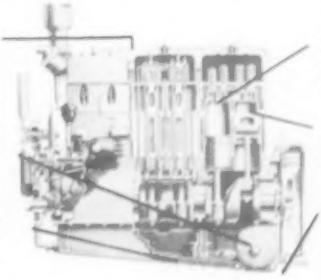
Oversize full-flow oil filters in base pan provide season-long capacity.

Thermo-clad water-blanketed base pan and by-pass cooling maintain uniform top-to-bottom engine temperature.



Stellite exhaust valve inserts, extra valve lift for maximum fuel charge, high torque power at moderate engine speeds.

High-turbulence combustion chambers provide complete fuel mixing for progressive fuel burning.

Cast base pan and wide flywheel flange gives effective 360° rear main bearing support. Crankcase extends nearly 4 inches below crankshaft center line.

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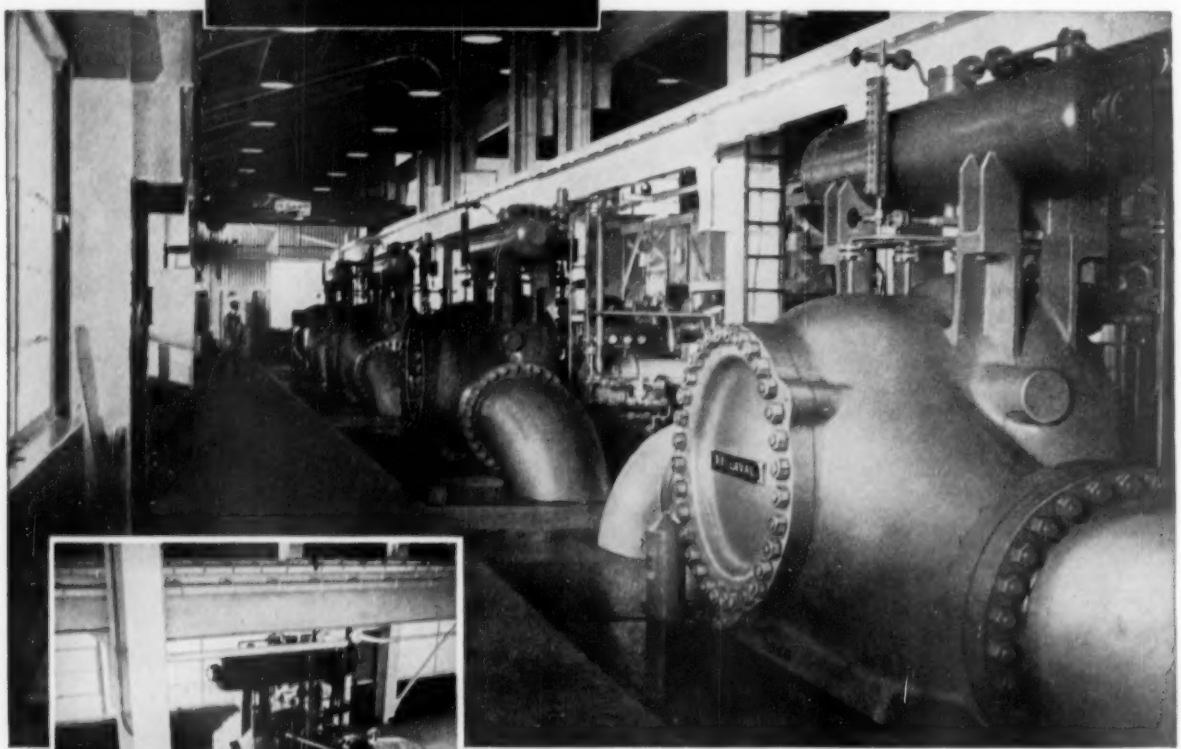
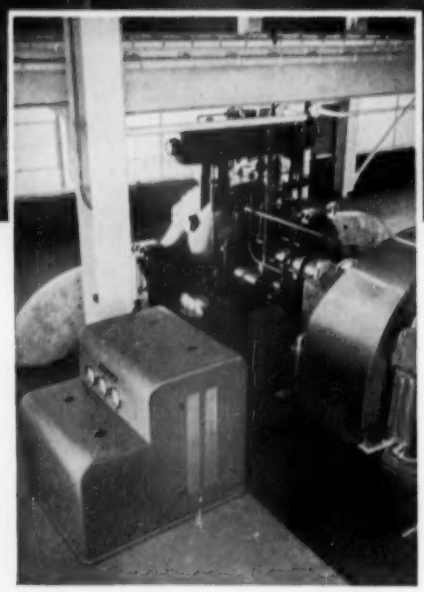
FOUR

DE LAVAL CENTRIFUGAL COMPRESSORS

in Tescott, Kansas station of Northern Natural Gas





For easy installation, De Laval pipeline compressors are designed in two packages: (1) The machine plus the emergency seal tank, (2) The auxiliary console which contains the filters, pumps, coolers and other accessories.

Here's more proof of the efficiency and dependability of De Laval centrifugal compressors for high pressure gas transmission. This Tescott, Kansas station of the Northern Natural Gas Co. has four De Laval centrifugal compressors in series.

The station flow is 930 M^2SCFD, station inlet pressure 477 psig and discharge pressure 745 psig. *By changing the impeller and a few minor parts, these units can handle 1,100 to 1,200 M^2SCFD.* Three identical De Laval compressors are on the job in the Macksville, Kansas station of Northern Natural.

De Laval centrifugal compressors offer important engineering features. • Pressure contact shaft seal eliminates gas leakage. • Construction is heavy and rigid throughout. • Units have high load carrying capacity. De Laval units, totaling more than 200,000 hp, are now in operation on major pipelines.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY

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The OIL AND GAS JOURNAL

Showcase

OF NEW EQUIPMENT AND LITERATURE

by Dan B. Miller

Chevrolet Invades Heavy-Duty Field

Chevrolet invades a heavier-duty commercial field with 40 new hauling giants. Capacities range up to 32,000-lb. maximum gross vehicle weight and 50,000-lb. gross combination weight.

Powermatic six-speed automatic transmission provides new safety advantages for heavy trucks on steep down-grades because of an in-built hydraulic retarder. Also effective on curves and other highway situations, the retarder's effect is up to six times engine drag with little or no service braking needed on most down-grades.

With a new 322-cu. in. V8 Loadmaster, truck engine choices this year total ten; five V8's and five 6's. The company's most powerful truck engine thus far, the Loadmaster generates 195 hp. and has a 0.8 to 1 short stroke-to-bore ratio with low piston travel per mile. Stroke is 3.2 in., bore 4 in., and compression ratio 7.7 to 1.

Stressing efficiency, economy, versatility, and safety combined with strength, Chevrolet's first offering of optional tandem-axle equipment includes the Loadmaster V8 with 13-in. coil-spring clutch, heavy-duty five-speed transmission, combination three-speed auxiliary and power divider, two 15,000-lb. axles and walking beam suspension. **For more information write or call: Chevrolet Motor Division, General Motors Corp., General Motors Building, Detroit 2, Mich.**

•

I-H Offers New Line of Pipe Booms

A complete new line of International pipe booms includes a size for every operation. Biggest of the new pipe booms is the TD-24 equipped with bottom-hinge counterweights, giving lifting capacity at 4 ft. of 110,000 lb. Another TD-24 model has top-hinge counterweights giving 90,000-lb. lifting capacity.

Other models are TD-18 with capacities of 70,000 and 38,000 lb.; a TD-14 with 30,300 lb.; and the smallest unit, the TD-9, rated at 16,000 lb. **For more information write or call: International Harvestor Co., 180 North Michigan Avenue, Chicago 1, Ill.**

•

Stratmaster Designed To Meet Load Qualifications

A new slim-hole drilling rig, the Stratmaster, designed for production drilling and stratigraphic exploration, will go to depths of 6,500 ft. with 2⅞-in. drill pipe. It was designed as a legal package and can be moved on to location and rigged up within a few hours. The rig is 8 ft. wide and 50 ft. long in traveling position. It is trailer mounted and weighs approximately 50,000 lb.

The new Stratmaster has a cantilever-type mast with a horizontally retracting top section. The mast has 83 ft. of clear space for the drill string and has a hook load capacity of 100,000 lb.

There are no guy wires on the mast or platform and 5-ft. clearance is provided under the rotary table without trailer ramps. Power for the unit is transmitted from an engine mounted on the drill frame through universal-joint equipped torque-tube drives. The trans-

mission is an Allison torquematic with three speeds forward and one reverse and may be shifted under load.

All controls in the Stratmaster are air operated and conveniently grouped in a console at the driller's position forward of the draw works. The rig is designed for use of Range 2 drill pipe and drill tubing. The rotary table has a 16-in. opening. Either gas or diesel engines may be used. **For more information write or call: George E. Failing Co., Enid, Okla.**

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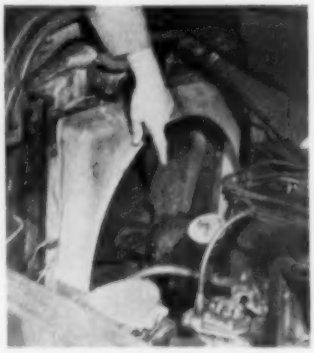

Fan Clutch Ups Horsepower And Reduces Fuel Costs

A newly developed electric fan clutch can produce fuel savings of approximately 10 per cent and increase horsepower available from the engine to mobile equipment.

Equipment of all types can use this clutch, including trucks, off-the-road equipment, tractors, motor boats, and many types of construction equipment. In every case, it is possible for the equipment manufacturer to deliver the vehicle equipped with an electric fan clutch.

Removal of the fan load during engine starting permits much faster warm-up and makes heat available to the heating system of the vehicle more rapidly. The more even operating temperature of the engine reduces sludging of lubricating oil and helps reduce condensation that dilutes oil in the crankcase.

Briefly, the fan clutch is a means to couple and uncouple the fan from its pulley, automatically. When the engine is running cool, the fan will be stopped, or it will revolve slowly from ram air through the radiator, but it does not require power. Whenever the engine reaches an operating temperature which demands cooling, the fan will be engaged by the clutch. It will then revolve as usual, at speeds varying with engine r.p.m. Automatic operation of the fan switch is achieved by the use of a thermostatic switch to operate an electromagnetic clutch. This switch is usually located in the water system so that it can sense a change in the water temperature and turn the fan on or off as required. A typical operating sequence would be to have the switch set to engage the fan when the water reaches 180° F. and to disengage it when water drops below 170° F.

All tests with the fan clutch operating automatically have shown that the length of time the fan is engaged is only a small per cent of the total running time of the engine. Analysis of all results showed that the fan was engaged only 40 per cent of the time, regardless of the outside temperature. **For more information write or call: Warner Electric Brake & Clutch Co., Beloit, Wis.**

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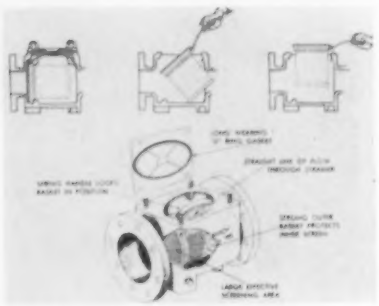

Redesigned Strainers Give Increased Versatility

A redesigned line of strainers, Model 763 offers straight-through flow, rugged construction, and increased versatility. Chief advantages of the new strainers are larger screening area and new, double-basket construction which protects the inner screen from being stretched or distorted by fast-moving large particles.

The new strainers are available in both in-line and angle models. These include 2-in. screw models and 3, 4, and 6-in. flanged models, all available in both 125-lb. cast iron and 125-lb. bronze construction, and in cast steel with either 600-lb. Series 30 or 1,200-lb. Series 60 flanges.

Angle-type, with center-to-face dimensions equal to a standard 90° ell of the corresponding pipe size, are available in 125-lb. cast-iron or bronze construction in 2, 3, 4, and 6-in. sizes. **For more information write or call: Meter & Valve Division, Rockwell Manufacturing Co., 400 North Lexington Avenue, Pittsburgh 8, Pa.**

●

West Offers Plug-In Feature on Instruments

This new plug-in accessory is applicable to all West instruments, being applied at the factory or furnished in kit form to be installed by the user. It was designed for application on con-

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tinuous processing where qualified maintenance personnel are generally not available on all shifts and where, in event of instrument lapse, the machine would normally be out of production. Inexperienced personnel, without knowledge of wiring or instruments, can promptly replace the complete temperature controller and assure production continuity. Using the plugin, a West instrument can be replaced in less than 5 seconds without tools or recordable temperature variation.

This accessory consists of two units. One is the complete temperature control with hand grips and mounted self-aligning plug. The other section is the housing which receives the first unit and provides the matching socket and external wiring terminal block. Gold-plated contacts, wiping action, and spring-loading in the plug and socket, assure trouble-free operation.

This assembly may be surface or flush mounted. To replace, simply slide out one instrument and slide in the other. **For more information write or call: West Instrument Corp., 4363 West Montrose Avenue, Chicago, Ill.**

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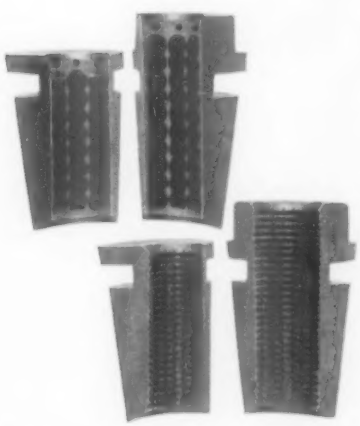

Long Slips Speed Running Long Strings

New long slips for the running of long strings of casing in Butler spiders are installed just as you would install regular-length strips. No adapters are required. These new button-type slips contain 25 per cent more buttons, and the new, long conventional-type slips provide the needed extra gripping surface. **For more information write or call: New Deal Specialty Co., Okmulgee, Okla.**

•

Air and Gas Bleeder Avoids Manual Bleeding, Shutdowns

A new air and gas bleeder, known as Model 3750, is constructed of corrosion resistant material where it is necessary. The bleeder provides a means to bleed gas from oil and air from water in gathering systems and is designed to prevent vapor lock in fluid lines. The new bleeder permits running of fluid through the lines and avoids manual bleeding and shutdowns.

The bleeder with hot-oil-dip-galvanized scrubber tubes is furnished with Synthane inserts, Hy-Car gaskets, Monel scrubber inserts, O-ring seal, and Vinyl float. The 57-in. body weighs 68 lb. All that is required for installation of the 4-in. size is a standard 4-in. opening.

The scrubber action collects the light ends which have vaporized and returns them to the pipeline, leaving a mimimum of liquid in the gas vented to the atmosphere. One bleeder will handle several tank batteries, retaining the salable liquid and reducing liability. **For more information write or call: Enardo Manufacturing Co., 2729 Sand Springs Road, Tulsa, Okla.**

Vibration-Leak Detector Is Transistorized

Detection and amplification of a wide variety of industrial sounds is made possible by a new pocket-size, transistorized audioamplifier. Sounds produced by fluid leaks in buried pipelines and by defective bearings or other moving mechanical parts are just a few of the many applications possible with the new Audio-Scope. Amplification to 85 db gain is provided by three miniature, hermetically sealed, low noise transistors. Power is supplied by a single, small, dry-cell battery good for approximately 100 hours of normal use. A single calibrated control governs response. The case is of anodized drawn aluminum. Size is 4 by 2½ by 1¾ in. Weight is only 15 oz. **For more information write or call: Fisher Research Laboratory, Inc., 1961 University Avenue, Palo Alto, Calif.**

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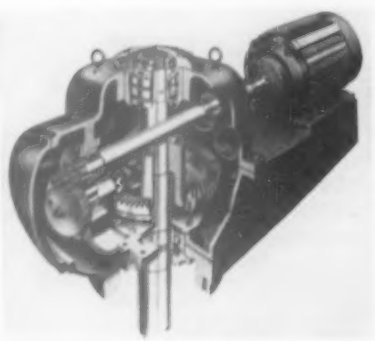

Agitator Has Low Head Room, Maximum Bearing Span

A feature of this new line of fluid agitators is its low head-room design, providing maximum bearing span with minimum head room. Helical-change gear set, within housing, allows for ready selection of up to 14 different standard speeds. Large heavy-duty output shafting results in less shaft deflection at stuffing box or mechanical

seal and steady operation of long overhung agitator shafts. Heavy-duty inboard bearing support provides extra rigidity resulting in superior gear performance and longer service life.

Spiral bevel gears of hardened steel are accurately lapped for long and quiet operation. Dry-well construction prevents oil leakage down output shaft. The labyrinth-type seal on input shaft allows effective sealing with minimum friction. **For more information write or call: Philadelphia Gear Works, Inc., G Street below Erie Avenue, Philadelphia 34, Pa.**

●

Two-Unit Bath Developed For Gum Determinations

Developed primarily for determinations of the gum content of aviation and motor gasolines by the air jet method, the two-unit gum bath is suitable for gum determinations of all aromatic and aliphatic petroleum distillate products in the distillation range below that of kerosine.

The bath is provided with a central distribution system which proportions equal volumes of air through the two preheating coils immersed in the bath and then onto the surfaces of the two samples. The concentration of the bath media is maintained by a Soxhlet condenser mounted above the bath. Heavily insulated with glass wool, the bath

has a three-heat switch for rapid heatup and easy maintenance of the operating temperature. **For more information write or call: Precision Scientific Co., 3737 West Cortland Street, Chicago 47, Ill.**

●

Pneumatic Transmitter Features Flexibility

A new pneumatic transmitter that can accurately measure either temperature or gage, as well as absolute pressure over narrow and wide spans, converts process temperatures from —375° to 1,000° F., or pressures of from 40 to 600 psi. to a standard 3-15 psi. output.

Simple adjustments make it possible to measure temperatures or pressures and to vary the span width or shift it anywhere within the range of the instrument. The flexibility and accuracy of the new instrument is expected to make it valuable where close process control and versatility are required.

An addition to the firm's line of Tel-O-Set recorders, indicators, and controllers, the new unit is shock mounted and designed to resist the effects of vibration. It compensates for ambient-temperature and barometric-pressure changes, eliminating the need for adjustment as these conditions change. The instrument operates on the force-balance principle which virtually eliminates motion, reducing wear and increasing longevity. A small, highly sensitive stainless-steel bulb provides fast response to temperature changes.

Installation costs for the new transmitter are reduced because it uses inexpensive, low-pressure tubing instead of the long-run capillary required by conventional instruments. Pipe, wall, or horizontal-well mounting is provided by a universal mounting bracket. **For more information write or call: Industrial Division, Minneapolis-Honeywell Regulator Co., Wayne & Windrim Avenues, Philadelphia 44, Pa.**

●

New Diaphragms Require Less Operating Power

Custom molded, heat and oil resistant, nitrile-type, convolute diaphragms are intended for applications involving temperatures up to 300° F.

Now being produced in sizes up to 30-in. diameter, molded with a single ply of high tensile fabric, these diaphragms are thinner and lighter in weight and require less operating power when used in hydraulic or pneumatically operated controls on dryers or valves located in hot areas. Most sizes are suitable for working pressures up to 100 lb. **For more information write or call: Stowe-Woodward, Inc., Molded Rubber Division, Newton Upper Falls 64, Mass.**

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"There's just one thing to do! Call in Pritchard."

"Why, Pritchard?"

"Two reasons. First, designing and building natural gas dehydration plants is one of Pritchard's specialties. Second, when Pritchard says 'dry', they mean *dry*."

"Haven't we worked with Pritchard before?"

"Yes, and they certainly surpassed our expectations. When they assume the responsibility for a gas dehydration project, you can be sure that the job will get done faster and you will get into production quicker."

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"What's that?"

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"Phil, what will we have to do to get dry gas?"

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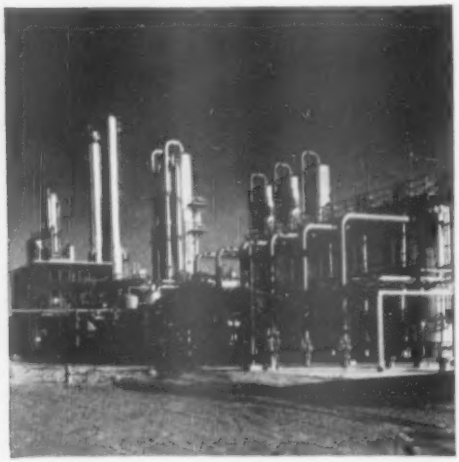

The gas industry has grown to respect Pritchard for the engineering and construction of dehydration plants.

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And they are capable of following up with construction that stands the test . . . and you can be assured of greater production for your operation.

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Welding Characteristics of Austenitic and Ferritic Stainless Steels. Information of interest and value to those associated with the fabrication and installation of process piping is contained in a new folder, TDC-162A. This folder provides information on the welding characteristics of both austenitic and ferritic types of stainless steels and briefly describes various welding methods and techniques. Also included is a table indicating electrodes, preheating and post-welding heat treatments to be used in joining the stainless steels to each other and to carbon, carbon molybdenum, and chromium molybdenum alloy steels by the arc-welding method. **For more information write or call: Tubular Products Division, Babcock & Wilcox Co., 161 East Forty-second Street, New York, N. Y.**

●

Modern Multiple V-Belt Drives. The origin, history, and development of the modern multiple V-belt drive is discussed in a new 36-page pocket-size booklet 20E8297. It also covers the evolution of standards in engineering V-belt drives, tells how to engineer a V-belt drive, provides tables and data, and describes modifications in V-belt drives. Final chapter of the booklet furnishes the answers to a number of questions relating to some of the basic principles and practices involved in the engineering and use of multiple V-belt drives. **For more information write or call: Allis-Chalmers Manufacturing Co., 1059 South Seventieth Street, Milwaukee, Wis.**

●

Kel-F Plastic Laminate describes a new lining material that can be applied to inexpensive containers, tanks, pipes, etc., making them lighter than, superior to, and less expensive than, costly alloy metals. The lining material is a laminate of Kel-F plastic fused and flowed into a glass-fiber-cloth backing. Conventional adhesives can be used to apply the laminate to practically any contoured surface, and it can be applied to large tanks and vessels right on the job without moving them to an applicator's shop. The characteristics of the laminate include extreme chem-

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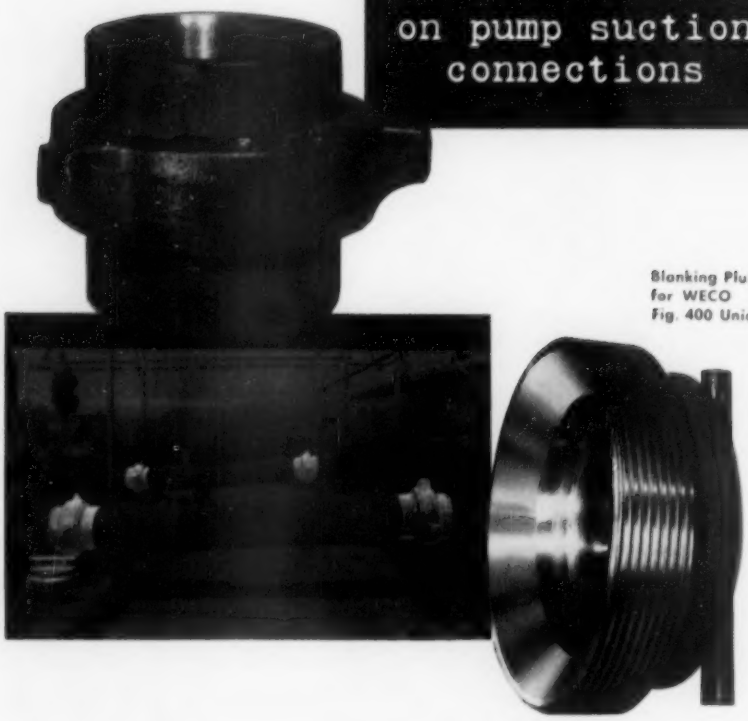

Blanking Plug for WECO Fig. 400 Unions

Constant vibration of pump suction connections is a rough challenge to the seal-ability of a union. **WECO's** ball and cone seat is engineered to take such vibration as a matter of course and hold a positive, leak-proof seal. A few hammer blows quickly make-up or break the connection – and you can always be sure of a perfect seal every time the union is made-up.

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ical resistance to acids, alkalies, oxidants, and solvents; nontoxic; high abrasion resistance, tensile strength, dielectric strength, and electrical resistivity; high and low temperature resistance; nonsticking, nonwetting surface, and low temperature flexibility. **For more information write or call: Garlock Packing Co., Palmyra, N. Y.**

●

The Role of Platinum Group Metals as Catalysts. This newest review of the platinum-group metals as catalysts is a most interesting and informative reference work. The new book outlines the general advantages and applications of platinum catalysts in surprisingly diversified applications. The technical division of the book has detailed sections on the catalytic oxidation of ammonia; gas purification and measurement of impurities in gases; supported platinum metal catalysts in chemical processing; and supported platinum metal catalysts in petroleum processing. **For more information write or call: Baker & Co., Inc., 113 Astor Street, Newark 5, N. J.**

●

Type G-1000 Power Slush Pump. National Supply Co.'s largest power slush pump is described in a new eight-page Bulletin 453, which covers the features, construction details, performance, and specifications of G-1000 pumps. This pump is rated at 1,000 input hp. and has bore and stroke of 8½ by 16 in. **For more information write or call: National Supply Co., 2 Gateway Center, Pittsburgh, Pa.**

●

Foamglas, the Cellular Stay-Dry Insulation for Piping and Equipment. Prepared in two colors, six-page Booklet FI-103 illustrates the various shapes and sizes of Foamglas, glass-fabric-jacketed Foamglas available for insulating piping, valves, and the curved surfaces of pressure vessels. Recommended application methods are given for any situation. A table shows thickness and coverage for nominal pipe sizes between ¼ and 24 in. **For more information write or call: Pittsburgh Corning Corp., 1 Gateway Center, Pittsburgh 22, Pa.**

●

Ethanolamines. A new 54-page technical data book fully describes monoethanolamine, diethanolamine, and triethanolamine listing their applications, chemical and physical properties, physiological properties, shipping specifications, handling and storage features, and a comprehensive bibliography. Complete analytical procedures to determine specific gravity, weight, boil-

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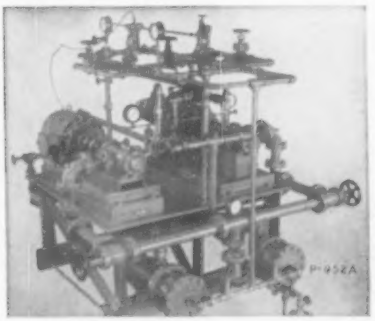

P-952-A—Steam Turbine and Electric Motor drive gives flexibility in this compact Model P-ES2H size No. 25 unit.

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NATIONAL AIROIL Fuel Oil Pumping and Heating Units are specially designed to prepare, for combustion, all grades of fuel oil including No. 6 or Bunker "C" Oil and residuums. They will draw fuel oil from above ground or underground tanks, preheat it to proper constant temperature and deliver it to Oil Burners at an even pressure, best suited for the burners. Our Fuel Oil Pumping and Heating Units are the result of years of experience. They come completely equipped ready for steam, exhaust, condensate, oil suction, oil return and electrical connections. All valves, regulators, etc., are readily accessible. The piping arrangement is easily understood. These compact, space-saving units are available in a range of sizes and models in both Medium and High Pressure types. For complete details, write for our Bulletin 40 — very interesting and informative.

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ing range, color, and odor are given. Graphic illustrations include data pertinent to viscosities, vapor pressure, densities, freezing curves, and other characteristics. **For more information write or call: Allied Chemical & Dye Corp., Nitrogen Division, 40 Rector Street, New York 6, N. Y.**

●

Air-Operated Piston-Valves, a perforated data sheet, describes the application of air power and remote control to Klingerflow piston valves. Since this valve has no seat, but is sealed by packing rings compressed around a sliding piston, power is required only to move the piston. No power is required to hold the valve in position. **For more information write or call: Richard Klinger, Ltd., Klingerite Works, Sidcup, Kent, England.**

●

Evenly Graduated Mechanical Flowmeter. Specification Sheet 242-2 describes mechanical flow meters with evenly graduated charts and scales. The meter body, which is a characterized bell float, is mounted integrally with the measuring instrument, forming a self-contained measuring system for pipe stand or panel mounting close to the point of measurement. **For more information write or call: Minneapolis-Honeywell Regulator Co., Industrial Division, Wayne & Windrim Avenues, Philadelphia 44, Pa.**

●

Here's the Answer to Your Industrial Bearing Problem! This four-page, multicolor brochure illustrates the shop facilities offered for complete rehabilitation of all types of industrial bearings. Rapid service is featured. **For more information write or call: Nickles Machine Corp., Ponca City, Okla.**

●

P-K Quick Opening Lever Lock, an illustrated four-page Bulletin 2030 in two colors, describes the P-K Lever-Lock quick opening door for heat exchangers. Five large photos show the P-K Lever-Lock door in use on horizontal and vertical equipment, with both manual and pneumatic control. The basic feature of the Lever-Lock, load equalization of supporting members, which enables it to be opened in 5 seconds, is shown in closeup. Other features of the Lever-Lock door, such as the self-sealing gasket that provides a positive pressure-tight joint, capable of withstanding pressure ranges from full vacuum to 300 psi., are described. A series of six additional photos show Lever-Lock door in pneumatic operation on a vertical heat exchanger. **For more information write or call: Patterson-Kelly Co., Inc., East Stroudsburg, Pa.**

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When you need equipment for your next well, call your Union Tank sales and service man. DAY OR NIGHT, his years of experience are available to you immediately. This service, combined with dependable Union Tank production equipment, means more profit to you. That's why it will pay you to know:

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EQUIPMENT MEN . . . in the News

Lawrence, Trapp Advanced To Key Halliburton Posts

Lloyd H. Lawrence has been advanced from assistant sales manager to sales manager of Halliburton Oil Well

L. H. LAWRENCE

C. E. TRAPP

Cementing Co. and C. Eddie Trapp from sales engineer to the new post of advertising manager.

The new sales manager began his Halliburton career in 1932, handling sales accounting for the oil-field-service company. He had since held several posts in the department.

The company's new advertising manager is a marketing and advertising specialist who first joined Halliburton in 1934. In his new post he will supervise advertising, public relations and associated functions.

Butler Is Named Sales Representative for O-C-T

John C. Butler has been named sales representative for Oil Center Tool Co., John Maher, president, has announced. Butler will work out of the Lafayette, La., branch.

Butler was formerly with Continental Supply Co. and Oil Well Supply Co.

Ratcliffe Retires as National Lead Executive

George L. Ratcliffe, director and vice president of National Lead Co., retires in February. He will continue as a director of National Lead.

Ratcliffe is best known in the oil industry as the organizer of the first company devoted exclusively to servicing and selling oil-well drilling muds. In this capacity he was for many years general manager of the Baroid Division, National Lead Co. He was also the first to introduce a fleet of laboratory-equipped field cars for testing oil-well drilling mud.

Ratcliffe started his career in the oil business in 1912. He held executive posts with various oil and gas firms before launching, in 1928, the company that is now Baroid Division, National Lead Co.

Caterpillar Supplies Diesel Electric Engines

Caterpillar Tractor Co. will supply all the diesel engines for two electric drilling rigs to be installed on new drilling barges for Penrod Drilling Co. One of the barges is being constructed by Bethlehem Steel Co. at Beaumont and the other by Levingston Shipbuilding Co. at Orange, Tex.

Each electric rig will have eight Caterpillar D397 diesel engines. Five of these will drive General Electric 752-J1 d.c. traction generators which will in turn power GE 752-H1- d.c. motors. Both rigs will use Emsco drawworks.

Turning at 1,200 r.p.m., the generators are rated at 500 hp. intermittent and 450 hp. continuous. The motors, rated at 800 hp. intermittent and 600 hp. continuous, turn at 900 r.p.m. Three of the eight engines will furnish auxiliary electric power. These generators are rated at 300 kw. continuously.

Race & Race Names J. A. Reaves to Houston Area

Announcement of the appointment of J. A. Reaves as salesman in the Houston area for Race & Race, Inc., Winter Haven, Fla., manufacturers of portable aluminum industrial pipe, has been made by Dave Scales, sales manager for the firm.

Reaves has been associated with Race & Race, Inc., for many years and has had wide experience in sales of Race & Race industrial pipe.

Johnston Pump Appoints Button to Sales Territory

W. J. BUTTON

William J. Button has been appointed district sales engineer in the Chicago area for Johnston Pump Co., according to Charles J. Schleeweis, sales manager.

Button's territory will cover Illinois, Ohio, Indiana, Michigan, and Wisconsin. Johnston Pump Co., Pasadena, Calif., manufactures and distributes vertical turbine and propeller pumps for use by industry.

Hawthorne Holds Sales Organization Meeting

Herb J. Hawthorne, Inc., sales executives met in Houston recently to discuss exploration-sales-market potentials in 1956 and outline the company's sales planning. At the meeting were: seated, W. T. (Bill) Brown, West Texas-New Mexico field service engineer, Lovington, N. M.; J. L. (Pat) Patterson, Gulf Coast field service engineer, Houston; C. T. (Charlie) Baker, Mid-Continent field service engineer, Oklahoma City; and C. Max Fountain, Rocky Mountain field service engineer, Denver. Standing are: Cary Gunn, Canadian field service engineer with Seismic Service Supply, Ltd., Calgary, Hawthorne Canadian distributors; Earl M. Weaver, general sales manager, Houston; Jack W. Thigpen, Central-South Texas field service engineer, Houston; and E. L. (Willie) Williams, Central-East Texas field service engineer, Houston.

Kerrigan Completes Expansion Plans

Philip Kerrigan, Jr., president of Kerrigan Iron Works, Inc., Nashville, Tenn., has announced expansion of their main offices. Construction has been completed on a two-story, brick addition. This building was necessary to provide space for the Greulich bridge-flooring division and expansion in the street-light-standard division.

Expansion plans include a 160-ft. addition to the company's river plant, made necessary by growth of the grating division. This addition will increase the length of the river plant to 600 ft. This building also houses a machine shop which is being expanded.

Kerrigan Iron Works has grown from an exclusive ornamental iron shop into a large manufacturer of open steel flooring, with three plants. The company has main offices in Nashville, general sales offices in New York City, and representatives in principal cities. Kerrigan steel flooring has been installed in power plants, oil and chemical plants, tank cars, and dome platforms. Two new lines of grating have been added, aluminum and steel riveted and welded stainless steel.

Bovaird Supply Completes Annual Sales Meeting

A satisfactory and encouraging year in 1955 was the highlight of the annual sales meeting of Bovaird Supply Co. recently held in Tulsa. Attending the meeting were 60 different managers, store managers, city sales representatives, and key personnel of the general offices.

The 3 days' sessions were conducted by Raymond E. Batchelor, vice president and sales manager; William J. Bovaird, general manager of stores; R. M. McMahan, secretary and purchasing agent; T. H. Trower, treasurer; and Roscoe G. Ayers, vice president and general manager, who also presided. D. D. Bovaird, president, reviewed the company's policies and accomplishments.

Three outside sales and management consultants addressed the meetings, and the company's employe insurance, welfare, and retirement plans were discussed.

Western Announces Changes In West Texas-N. M. Area

Several promotions and transfers in the sales department of West Texas-New Mexico region of The Western Co. have been announced by M. E. Woodward, regional sales manager. A. P. Brown of Odessa; W. R. McBrayer of Hobbs, N. M.; C. E. Smith of Lubbock; and Glenn Holloway of Snyder have been promoted to area sales supervisors.

A. F. Stevens, sales engineer, recently has been moved from Seagraves to Andrews, Jon Cowsor is now located at Brownfield as a sales engineer. Don Hammack has been moved from Odessa to Monahans as a sales engineer.

J. T. Weaver has been transferred to the sales department as a sales engineer at Odessa. John B. Loftin has been added to the sales staff in Midland as a sales engineer. Charles Craig has been promoted from service engineer to field supervisor at Snyder.

Brown previously had been senior sales engineer for the Odessa district. He joined the company in 1952 as a field salesman. McBrayer has been senior sales engineer at Hobbs. He started with Western in 1952 and had worked as sales engineer and district operations manager in the Ulysses, Kans., district before being assigned to Hobbs.

Smith has been senior sales engineer with headquarters in Lubbock. His sales area covers the Levelland and Seagraves districts. He has been with the concern since 1944 and has worked both as a station and as a district operations manager.

Holloway has been field supervisor for the Snyder district. He has been with Western since 1948. Before his recent promotion, Snyder had worked in the Snyder district as a service engineer.

Continental Makes Sharp Manager Venezuelan Branch

The appointment of William G. Sharp, former district manager of Continental Supply Co.'s New Orleans, La., district, as manager of Venezuelan operations has been announced by the company. Sharp will be succeeded as district manager by Edward A. Dunn, former sales engineer for that area.

W. G. SHARP

E. A. DUNN

Sharp, who will headquarter in Caracas, Venezuela, will have under his supervision stores at Anaco and Lake Maracaibo in Venezuela, as well as other areas of northern South America. He joined Continental in 1947 and has since held positions as field salesman, store manager, and assistant district manager.

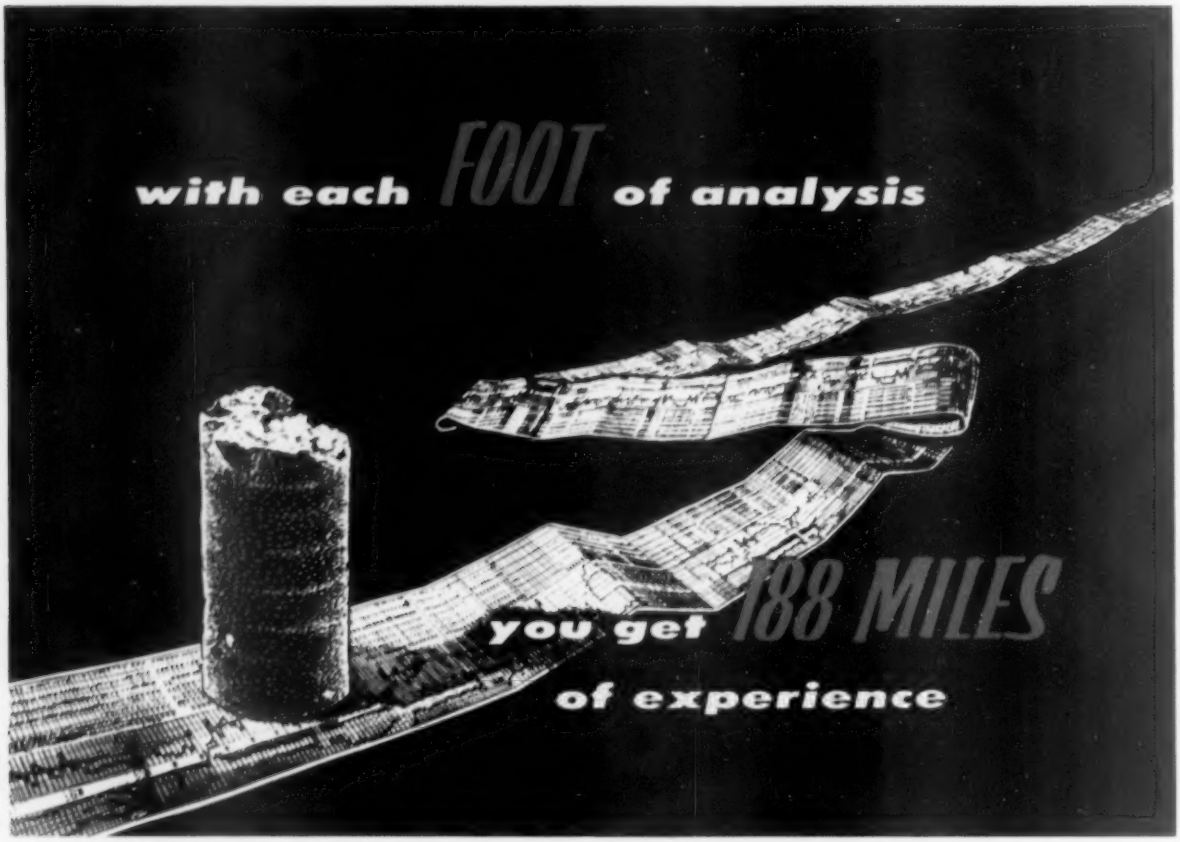
Dunn joined Continental in 1946. He has held positions as field salesman, city salesman, and sales representative. Under Dunn's supervision in the New Orleans district are stores in Eunice, Harvey, Houma, and New Iberia, and an office in Lafayette, all in Louisiana.

Noll to Direct Houdry's Foreign Operations

The appointment of Henry D. Noll as director of foreign operations, a newly created post, has been announced by Houdry Process Corp. Previously, Noll had been director of engineering and was active in expanding Houdry operations in Europe and on other continents. He has been with Houdry since 1944.

In his new post, Noll will represent both the Process Division and the Chemicals Division of Houdry. The Process Division licenses the use of catalytic processes (Houdriflow, Houdriforming, Iso-Plus, Houdresid and Houdry Dehydrogenation) in the petroleum and petrochemical industries. The Chemicals Division makes and markets catalysts for use in refining and other industries.

Noll's headquarters will continue to be at the corporation's principal offices in Philadelphia, pending selection of a European location for the foreign sales office.



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There is no more decisive stage in an entire exploratory effort than the moment when samples of a cored interval are brought to the surface. The monetary significance of preceding events demands the best available information on the physical make-up, contents, and productive potentialities of the formation.

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EXPLORATION

Red Earth—Canada's Incendiary Discovery

by John C. McCaslin

THE biggest discovery news in western Canada since Pembina is sweeping across the Prairie provinces like fire. The catalyst of this excitement is Union Oil Co. of California's 12-17 Red Earth Creek Granite Wash oil discovery, 220 miles northwest of Edmonton in the Peerless Lake region.

Wildcat excitement reigns . . . Important wildcat strikes are nothing new to Canadians these days. Exploration in western Canada in the past 3 years has turned up such new important reservoirs as Pembina (the Alberta "giant"), Westward Ho, Sundre, and Harmattan.

Two weeks ago Union startled the industry with a prolific Granite Wash well on LSD 12, 17-87-8w5, 120 miles northeast of production at Sturgeon Lake. The Red Earth well flowed at the rate of 792 bbl. of oil per day on restricted choke during a 2-hour production test in the Granite Wash at 4,744-59 and 4,766-80 ft. It had kicked off naturally after the drilling mud was displaced with water. Gravity of the oil is 38°. Casing pressure was 600 psi.; tubing pressure was 320 psi.

The Red Earth Creek well was first reported as a discovery after three drill-stem tests gave large recoveries of clean oil with no formation water in evidence. Two of the drill-stem tests got 4,590 and 4,000 ft. of clean oil. The apparent thick pay section (60 ft.), the comparatively shallow depth, the complete absence of formation water, and favorable formation pressures place this discovery at the top of promising discoveries in Alberta in recent months. The wildcat was staked on combination subsurface and seismic data. The subsurface information came from two dry holes drilled by Imperial Oil, Ltd., 4 years ago about 4 miles from the Red Earth discovery.

Union is moving fast. The company announced location for its 14-8 Red Earth Creek well, about 4½ miles due north of the discovery well. The 14-8 is located about the center of Union's reservation block No. 2351. This block spans about 100,000 acres. Ground elevation is 1,775 ft., and Regent Drilling Co., of Edmonton, will drill the hole. It also spudded a well at 1-4 Loon River, about 20 miles northwest of Red Earth. The company has exploration rights on a solid block covering 708,480 acres around the discovery well.

North American oil circles are buzzing with excitement as a result of Union's Granite wash discovery at Red Earth, the best strike yet from this pay zone.

Granite Wash's stock climbs . . . The Granite Wash is comparatively new to the list of producing horizons in western Canada. Early last year the Clear Hills discovery in western Alberta, 115 miles west of Red Earth Creek, kindled new interest in the potentialities of this zone. Later such pools as Smoky Heights, Giroux Lake, and Iroquois River were added to the Granite Wash production column. Look for big things from this pay zone in near-future exploration.

Hottest land play since Redwater . . . The Red Earth Creek discovery lighted the fuse for the biggest land rush in western Canada since the D3 Devonian oil strike at Imperial Oil Co. 1 Redwater in 1948.

During the January 15-February 15 period, 12,538,248 acres of Crown rights were issued by the Alberta Department of Mines and Minerals as new oil and gas reservations and other transactions boosted the total to 13,013,566 acres. The previous record was after Redwater . . . 10,293,771 acres.

According to reports, the heated land play extends from Fort Vermilion at the top of the Alberta map in an arc through the Red Earth Creek area to Cold Lake on the Saskatchewan border, and then on into the province for about 150 miles. This is an arc of about 450 miles. More than 1,000,000 acres of Saskatchewan Crown permits have been filed on. The 158 reservations filed on in the Red Earth Creek land rush were issued to 38 separate companies and individuals, covering 12,497,953 acres. Shell Oil Co. headed the long list, filing on 28 reservations or 2,671,696 acres. Imperial, Canadian Gulf Oil Co., and Amerada Petroleum Corp. all took out exploratory rights on over 1,000,000 acres.

Pipeline outlet . . . The nearest outlet for Red Earth production is the Peace River line at Sturgeon Lake, about 125 miles southwest. The Peace River line will be completed this month, tying in near Edson with Transmountain.

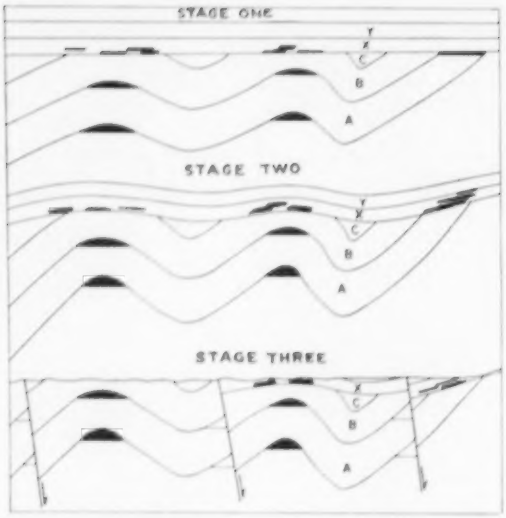

FIG. 1—The geologic history of area explains why fault closures are nonproductive but prolific production is found in the anticlines.

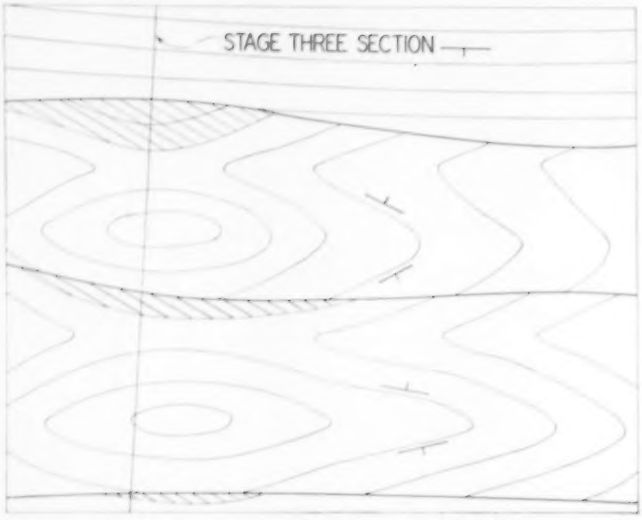

FIG. 2—This structural map shows the fault closures that should be oil traps but are barren because the faulting occurred after the folding and too late to trap the oil.

Here's a "fourth dimension" you can't afford to overlook . . .

How the Time Element Affects Oil Traps

by Robert H. Paschall

Knowledge of the geologic history of an area is essential in order to determine if the time element favors the accumulation of oil. For "If timing is wrong, it is a waste of time to look for traps" (Gussow). Obviously, then, geologists must weigh the time factor carefully when analyzing a structure's potentialities.

THERE is nothing secret about the use of the term "fourth dimension." It refers simply to the time element of a geologic problem. There is no geologist, certainly, who ignores the time element when he considers stratigraphic sequence. Geologists should not ignore it when analyzing structure. There's a suspicion, however, that structure commonly is treated as a problem in geometry. Even the search for stratigraphic traps can be treated simply as a three-dimensional problem, but the fourth dimension may be lurking in the underbrush to trap the unwary.

In geologic literature, the element of time is accorded full treatment only in studies of migration and accumulation of oil. However, a phrase here and there reveals that many writers have time on their hands. Levorsen, in his Geology of Petroleum, remarks: "Many discrepancies between shallow and deep structure cannot be foretold, but some may be anticipated . . . if the geologic history of the region is known." Gussow, in his paper on differential entrapment, says "If timing is wrong, it is a waste of time to look for traps."

Fig. 1 is an actual field example whose geologic history suggests why the area has been a notorious dry-hole factory along two belts of provable structural closure.

At the time of Stage One, a good deal of history has already transpired. Beds A, B, and C have been deposited, folded, and oil has accumulated on the anticlines. The folds have been peneplaned, X and Y have been deposited, and seepage oil has moved from the folds into the flat beds above.

At Stage Two time, additional folding makes it appear that the oil in the younger beds has been trapped anticlinally, but the picture above makes it evident this is only coincidence. The oil would be there even if there had been no second period of folding. Actually, it has such high viscosity that it has not adjusted to the second folding.

Stage Three differs from Stage Two only in renewed uplift and erosion, and in the presence of three steep faults. These faults are known to be younger than all other orogeny. It is obvious that, in cross-section, fault traps have been formed and oil accumulations might be expected there.

Fig. 2 shows a plan view of the area, and reveals that well-defined fault traps are present in all three dimensions of geometry. These traps are commonly more than 1 mile long, and have as much as 500 feet of structural relief.

Area history . . . The history of oil ex-

Author is with Hancock Oil Co., Ventura, Calif., U.S.A.

"The time factor can contrive to conceal oil fields as well as reveal the reasons for their absence."

ploration in the area is, briefly, this: Three anticlines were drilled and found productive. When operators ran out of anticlines, they started drilling the fault closures. None of these closures—and they are numerous—has produced any oil. Shows have been encountered, but that is all.

It seems evident in this case that oil migration and accumulation on the anticlines had run its course before the faults were reared as barriers. The oil shows found near the faults represent simply the unprofitable tail-end of migration.

It also appears reasonable to assume that the time element here has solved a structural mystery.

Fig. 3 shows three maps, based on three different moments of time, of an area about 10 miles long and 2 miles wide. Present structure is a northwest-dipping homocline cut by numerous small faults and bounded updip by a major fault. The numerous fault closures suggest a happy hunting ground for oil men. In actual fact, they have all been drilled, and virtually dead oil sands have been encountered in each. But only one subcommercial well has been completed.

Turning back the geologic clock, the latest orogeny (a 12-degree west tilt) can be removed. This leaves the homocline as steeply dipping as before, but changes its strike 30° to 40°. Removal of the minor faulting, which occurred at about the same time as the tilting, reveals a homocline which has a slight east plunge instead of a strong west plunge as at present.

It is apparent that oil migration prior to the latest orogeny would have moved to the west and southwest. Also unless flushed out by the late tilting, it should still be there.

It is interesting to note that there are now productive oil pools present at the level of the horizon contoured, just off the southwest edge of the map. What is more, as the map of present structure shows, the producing areas are structurally much lower than some of the present-day nonproductive fault traps.

Summary . . . The geologic history of the area, then, may be summarized as follows:

1. Deposition of a sedimentary sequence.

2. Northward tilting, accompanied by major faulting updip. Movement of oil to the west and southwest, leaving a dead-oil residue behind.

3. Minor faulting, followed by a regional west tilting. The southwesternmost of the minor faulting (not shown) prevented movement of the oil up the new regional plunge into the newly formed fault traps.

Once again, time analysis affords an answer for a structural riddle. It is obvious that the two examples above have fundamentally a negative approach and do not offer leads for exploration. Time analysis, however, can be a positive as well as a negative tool. The time factor can contrive to conceal oil fields, as well as reveal the reasons for their absence.

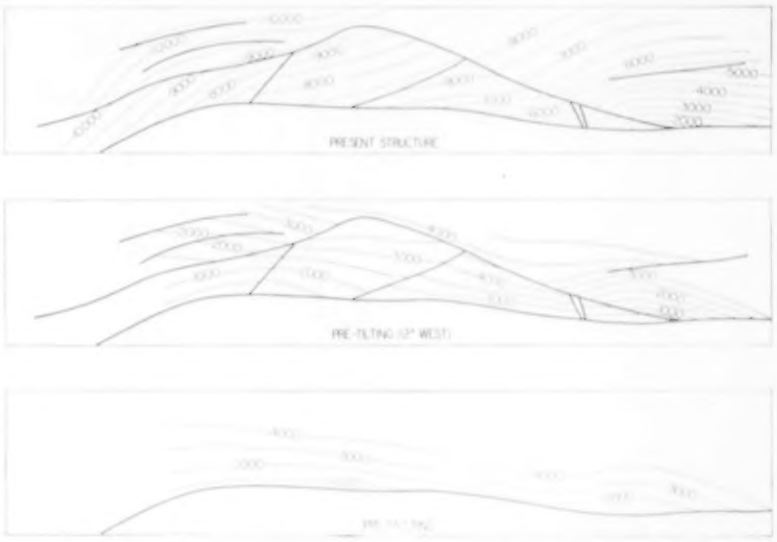

FIG. 3—Analysis of the geologic history explains why the present fault closures are barren. Prior to the tilting and faulting, the high part of the area lay to the west as shown by the pre-faulting structural map.

EXPLORATION HIGHLIGHTS

MID-CONTINENT

KANSAS

Big Gas Well Tested In Barber County

Petroleum, Inc., is testing a big gas well in southern Barber County. The I Hall "F," SW NE SE 36-33s-13w, flowed open at the estimated rate of 40,000-50,000 M.c.f. daily from the Mississippi chat. The well is 1 mile north of new Driftwood pool and will either be an extension to that pool or a new gas discovery area.

Mississippi Oil Strike In Harper Flows 60 BOPH

Pickrell Drilling Co. has a good Mississippian oil discovery at 1 Stone in SE SW SW 7-32s-9w, northwestern Harper County.

The well flowed 60 bbl. of oil per hour, natural, from open hole in the Mississippi at 4,350-60 ft.

OKLAHOMA

Third Pay Added to Harper County Strike

A third pay zone is indicated at Magnolia Petroleum Co.'s 1 Stinson in C NE SW 12-26n-25w, Harper County, northwestern Oklahoma. The new pay prospect is the Morrow sand at 6,964-7,023 ft.

A drill-stem test in the Morrow surfaced gas in 4 minutes at 3,700 M.c.f.

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per day. Recovery was 75 ft. of brown distillate and 125 ft. of gas-cut mud. The operator also tested production possibilities in the Hoover sand at 4,263-82 ft. and the Tonkawa at 5,536-80 ft. Both flowed commercial gas.

NORTH TEXAS

Taylor County Discovery Makes Heavy Oil Flow

The Chicago Corp. 1 Arnett Weeks, Section 447, George Hancock Survey, opened Morris sand production in the Atwood field area with a flowing potential of 312 bbl. daily. Production was through ¼-in. choke, from perforations at 3,745-64 ft. Gravity was 39° and gas-oil ratio was 707:1. Top of pay was 3,745 ft. on elevation of 1,944 ft. Flowing tubing pressure was 400 psi.

Location of the well is over 1 mile southwest of the 1-well Atwood (Morris sand) pool, but separated by a 4,300-ft. dry hole.

Miami Operating Co. has made location for a second test in the Shaffer pool 2 miles northwest of Moro in Taylor County. No. 2 Shaffer is an east offset, and is projected to 5,000 ft. with rotary.

The discovery, by the same operator, was completed in January for a daily potential of 576 bbl. of oil, through ½-in. choke, from pay at 4,337-46 ft.

Flippen sand opener . . . Hack Drilling Co., Abilene, 1 Connelly Powell opened Flippen sand production 3 miles north of Tuscola in Taylor County. Calculated daily potential was 158 bbl. of 40° oil, based on a 12-hour flowing and pumping test. Pay was perforated at 2,096-2,111 ft. Location is in Section 67, Asylum Lands. The same operators had a west extension and assured second producer ready to perforate in the Flippen.

HUGOTON EMBAYMENT

OKLAHOMA PANHANDLE

Morrow Gas Discovery Completed in Beaver County

Lion Oil Co., a division of Monsanto Chemical Co., has completed the 1 Leota as a gas discovery well in Beaver County.

The 1 Leota, located in 22-6n-24eCM, flowed 8,720,000 cu. ft. of gas per day through 2-in. tubing with 1,475 lb. casing pressure. Production was from the Morrow sand with perforations from 6,165 ft. to 6,171 ft. and 6,179 ft. to 6,186 ft. Drill-stem tests indicated gas production in the Cherokee and Kansas City formation, although only the Morrow sand has been perforated. The well has a total depth of 6,390 ft.

TEXAS PANHANDLE

Texas County Gets Production

Humble Oil & Refining Co. has discovered the first production in Lipscomb County of the Texas Panhandle. Its 1 W. C. Merydith, 14 miles west of here, flowed 1,110,000 cu. ft. of gas per day plus 29 bbl. of condensate.

The flow was on ¼-in. choke through perforations at 10,162-10,205 ft. in the lower Pennsylvanian. Humble now is waiting for potential tests.

Nearest production is in the Buler area of Ochiltree County, about 10 miles southwest.

APPALACHIAN

OHIO

Mutual Oil & Gas Co. extended Greer pool nearly ½ mile to the northwest with a gasser on W. R. Shoults, Section 2, Jefferson Township, Knox County. Clinton sand was found at 3,015-52 ft. with a gage of 575,000 cu. ft. natural and a rock of 1,150 lb.

- Preston Oil Co. moved ¼ mile north of the 2 Williamson and brought in a probable extension to the new Blissfield pool in Clark Township, Coshocton County. On 1 Earl Water, Section 17, sand was logged at 3,495-3,562 ft. with 750,000 cu. ft. gas and a showing of oil natural. Sand was to be fracture treated.
- E. C. McManaway's 1 Joe Vega, Lot 3, Eaton Township, Lorain County, was fractured and gaged 25 bbl. and 760,000 cu. ft. gas.

WEST VIRGINIA

In Union district, Preston County, West Virginia, Columbia Carbon Co. 1217 Theodore R. Rembold wildcat, elevation 2,599 ft., is shut down at 5,520 ft., after running 7-in. casing.

- Dry Fork district, Randolph County, Nelson W. Taylor, Agent, 1 H. R. Tingler, is drilling at 1,690 ft.
- Glade district, Webster County, his 1 Victoria Riddle, is at 2,070 ft.

EASTERN KENTUCKY

On Troublesome Creek in the Knott County sector of Big Sandy gas field, W. W. Lindsey has completed 2 Polly B. Smith as a Devonian black shale gas producer. At total depth of 2,911 ft., well gaged initially at the rate of 200,000 cu. ft. of gas daily with a rock pressure of 500 psi.

PACIFIC COAST

CALIFORNIA

New Gas Pool Find Near Sacramento

Brazos Oil & Gas Co. has scored a new gas pool discovery in the Isleton Unit of Rio Vista gas field in Sacramento County.

Brazos dually completed 5 Langhart-Spreckles in both the Capay zone at 4,356-4,436 ft. and the new "M-5" zone at 5,068-80 ft. The new zone tested at 2,700 M.c.f. daily through a ¼-in. choke and the Capay at 1,400 M.c.f. through the same size choke. This well is located NE NE 26-4n-3e.

Report Successful Test On Wheeler Ridge Wildcat

Richfield Oil Corp. is reported to have had a successful test at 9,000 ft. on a "no dope" wildcat 2 miles southeast of production in the Wheeler Ridge area of Kern County. This wildcat, 52-36 KCL-F, is successfully completed for a new discovery, can be expected to touch off increased drilling in the area, which is midway between Wheeler Ridge field and Tejon field to the east. Three companies, Sunray Mid-Continent Oil Co., M J M & M Oil Co. and Mohawk Petroleum Corp. have leases within ½ mile of Richfield's wildcat.

Shell Stakes New Deep Vedder Test

Shell Oil Co. has staked location for a southwest extension test of the deep Vedder zone in the Posuncula area of Strand field, Kern County. This new test, 64-12 KCL, will be drilled on a site just 200 ft. north of an 8,970 ft. wildcat the company abandoned in 1942. At that time Shell perforated the wildcat at 8,654-38 ft., but it tested wet. A ¼-mile north of 64-12 KCL, Shell recently completed 131-12 KCL in the Vedder at 12,362-88 ft.

Middle Dome Completing Second Well in Kreyenhagen

Middle Dome Corp. was plugging back its second well for a completion attempt in the Kreyenhagen shale of the Middle Dome region, Kettleman Hills field, in Kings County.

The operator was cleaning out 52-30V to the top of the liner preparatory to plugging back the 12,288 ft. well and recompleting it in the Kreyenhagen at 11,000 ft. This well was originally completed at 12,100-12,205 ft. in 1949.

Middle Dome did the same thing re-

cently when it recompleted 38-19V, located ½ mile north of 52-30V, for 460 bbl. daily of 45°-gravity crude at 10,940-11,040 ft. This test was first completed at 11,151-12,220 ft. but production declined rapidly.

WESTERN CANADA

ALBERTA

Cardium Strike Indicated At Pembina River Well

The four company team of Southern Production Company, Inc., Canadian Atlantic Oil Co., Pacific Petroleums, Ltd., and Calvan Consolidated Oil & Gas Co., Ltd., has indicated discovery of crude oil in the Cardium zone at a driller in the Pembina River area of central-west Alberta. The team had previously scored oil discovery in the Belly River formation but had drilled ahead to test Cardium formation prospects as the Cardium sand oil field of Pembina lies 28 miles east of the new strike.

The well, Southern Production A-2-3, Canadian Atlantic on LSD 5, 26-47-15w5, contacted the Cardium sand around the 8,100-ft. level and drill-stem-tested the interval 8,108 to 8,132 ft. for 1 hour.

Natural gas flowed to the surface at the rate of 124,000 cu. ft. daily and remained constant throughout the remainder of the test. The pipe recovery consisted of 180 ft. of 43.5°-gravity crude oil and 180 ft. of gas-cut mud. Previous tests in the Belly River zone encountered recoveries of up to 480 ft. of 35° oil.

Crew has since reached total depth and are preparing to set production casing and then will fully evaluate the find.

Gas Flow Recorded At Two Creek Wildcat

Canadian Gulf Oil Co. encountered a flow of natural gas at the rate of 3,100,000 cu. ft. daily during a drill-stem test run at its 6-11 Two Creek exploratory venture in the Whitecourt area of Alberta.

This indicated discovery well lies on LSD 6, 11-63-16w5. It was taken to a depth of 6,615 ft. before encountering any encouragement. At that depth, which is bottomed in the Triassic formation, the gas flow was encountered when a drill-stem test was run of a 25-ft. interval. There was also a salt water flow to surface and when pipe was pulled it was found to contain, 20 ft. of gassy oil-cut mud and 250 ft. of salt water and gas-cut condensate.

Stanolind Takes Production Tests at Chinook Ridge

The Viking sand paid off handsomely last week at Stanolind's A-1 Chinook Ridge discovery in a remote area of western Alberta, just inside the British Columbia line. The well flowed gas at rates up to 30,000 M.c.f. per day with 14 bbl. of condensate per million.

This well is on LSD 3, 12-65-13w6, 55 miles southwest of Grande Prairie. Completion depth of the well is 11,471 ft. The production casing was run to 11,454 ft. for Viking tests. The gas was topped at about 9,047 ft. Perforations were at 9,090-9,115 ft. Further tests are under way this week.

Stanolind Oil & Gas Co.'s Chinook Ridge discovery flowed 30,000 M.c.f. of gas per day with 14 bbl. condensate per million.

BRITISH COLUMBIA

Production Tests Due At Big Arrow Creek

Canadian Decalta Gas & Oils, Ltd., announced that the Richfield Oil Corp.-Canadian Decalta 1 Big Arrow Creek, being drilled on British Columbia Permit No. 170 approximately 71 miles north of Fort St. John, is currently drilling at a depth of 3,564 ft. in the Triassic, after encountering gas shows in the Cadomin, Bluesky and Upper Triassic.

The well, Richfield Decalta 1 Big Arrow Creek, is located at 57 degrees 8 minutes, 48.8 seconds North of Latitude and 120 degrees 45 minutes 93 seconds West of Longitude.

Drill-stem tests to date indicate flows of 854,000 cu. ft. daily in the Bluesky, 880,000 cu. ft. daily in the Cadomin and 100,000 cu. ft. daily in the Upper Triassic. It is felt that the commercial aspects of the well are good and production casing will be run and production test operations carried out.

The well is slated to test the Permo-Pennsylvanian and Mississippian at an expected total depth of 5,700 ft.

ROCKY MOUNTAIN

WYOMING

Cottonwood Creek Well Flows at Prolific Rate

A prolific Cottonwood Creek well in Washakie County, Big Horn basin, flowed at the estimated rate of 2,516 bbl. of oil per day. The big well is British-American Oil Producing Co. 1-B Hoenshell, W½ NW SE 17-47n-90w, an extension well to Cottonwood Creek field.

The well's big flow potential is based on an hourly flow of 109 bbl. for 4 hours. Perforations are in the Phosphoria-Permian at 6,017-57 ft. Structurally, the well is 1,100 ft. higher than the field discovery well. Stanolind Oil & Gas Co. opened the field in 1953 at 1 Unit, C SW SW 2-47n-91w. It was completed for 188 bbl. per day through perforations at 7,270-7,323 ft.

Mesaverde Discovery Flows Oil in Shawnee Area

A Mesaverde oil discovery was reported in Converse County's Shawnee area, southern Powder River basin. The strike is C. C. Thomas 1 Government in C SW SE 34-34n-69w, about halfway between Lance Creek and Douglas fields.

The flow was 90 bbl. of oil daily, 10 per cent water-cut. Production is from Mesaverde, the first oil production from this zone in the southern Powder River basin at 6,864-7,265 ft., open hole.

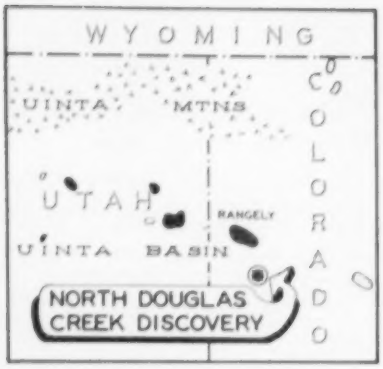
Testing Under Way at Manderson Muddy Discovery

Mobil Producing Co. F-41-24-G, SE NE NE 24-50n-93w, Manderson area, Big Horn County, flowed 1,992 M.c.f. of gas per day from the Muddy sand, topped at 6,524 ft. The Muddy prospect is 3 miles west of Manderson field production, 1 mile west of Manderson's Phosphoria production.

NORTH DAKOTA

Blue Buttes Field Has Seven Producers

The seventh well in McKenzie County's Blue Buttes field was completed last week. The well is The Texas Co.'s 2 Government-Dorough "D," NW SE 8-151n-95w. The newest producer in the field flowed 462 bbl. of oil on a 22-hour test of the Madison through perforations at 9,252-9,362 ft. It is an 80-acre offset to the discovery well of the field.



Phillips Petroleum Co. is completing its North Douglas Creek Weber sand oil discovery in the Rangely region of northwestern Colorado.

COLORADO

Important Rio Blanco Test Completing for Oil in Weber

Phillips Petroleum Co. is installing pump at the 1 Douglas "A," E½ NW NE 19-1s-101w, Rio Blanco County.

This highly significant discovery is a Weber-Pennsylvanian oil discovery. The operator swabbed 242 bbl. of oil in 10½ hours. The well then flowed 161 bbl. of oil in 11 hours, 105 bbl. in 10 hours, 104 bbl. oil in 10 hours. Perforations are at 7,517-98 ft. The well is in the North Douglas Creek area, 15 miles northeast of Hells Hole Canyon, lying north of the Douglas Creek field.

Tests Reported at Adams County Wildcat

Muddy water was recovered on a test of the "D" sand and oil and mud-cut water on test of the "J" sand at New Drilling Co.'s Adams County wildcat, the 1 Rosener, C NW SE 8-1s-59w.

Oil-stained sand was reported in "D" and "J" sand cores. Drilling is below 6,275 ft. This prospect is located 3 miles west of Rosener field.

Last Chance Field Well Reports Oil Recovery

An extension well to Washington County's Last Chance oil pool recovered 20 ft. of sand with stain, odor, and fluorescence on core at 5,046-5,101 ft.

The well is J. W. Braden's 1 Hanley, C SE SW 23-3s-56w. It is located ½ mile southwest of Last Chance field proper.

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SOUTH DAKOTA

Discovery Prospect Is Dry and Abandoned

Sun Oil Co. has abandoned its 1 Gregg-Government in NW SE 21-22n-5e, Harding County, 8 miles northeast of Buffalo field. The well had previously recovered free oil on test of the Red River-Ordovician at 9,220-60 ft., promising a prospective new field for the state. Subsequent tests recovered small oil shows and considerable water.

UTAH

Paradox Oil Discovery In San Juan County

The Texas Co.'s San Juan County oil discovery in the Paradox basin is complete. The well was finaled with production in the Paradox-Pennsylvanian for 1,704 bbl. of oil per day. Gravity is 43.3°. The operator reported top of the Paradox at 5,708 ft.

This oil discovery is the most important strike in the Paradox basin since Gulf Oil Corp.'s Coalbed Canyon Unit well. Later developments there proved disappointing. The Texas Co.'s 1 Navajo discovery, C NW NE 23-40s-24e, is 12 miles northeast of Desert Creek field.

Efforts to confirm the new discovery are moving along at a fast clip. Texas will drill in 22-40s-24e, Superior Oil Co. in 14-40s-24e, and Shell in 29-40s-23e.

There was no water recovered reported in tests of the Paradox at the 1 Navajo. The well's big flow is the best gage yet in the Paradox basin exploratory program.

NORTHWEST NEW MEXICO

Dual Completion Reported At Rio Arriba Wildcat

Amerada Petroleum Corp. completed the 3 Jicarrilla-Apache "A," NW SE SW 23-25n-5w, Rio Arriba County. The well flowed 330 M.c.f. of gas and 88 bbl. of oil daily from the Graneros and 559 M.c.f. of gas per day from the La Ventana. Total depth of the discovery well is 7,505 ft.

WESTERN NEBRASKA

Rank Chase County Wildcat Is Abandoned

Jones, Shelburne & Farmer have abandoned the 1 Robertson, rank Chase County wildcat. Total depth was 4,993 ft.

A drill-stem test at 2,491-2,526 ft. recovered 350 ft. muddy water. In

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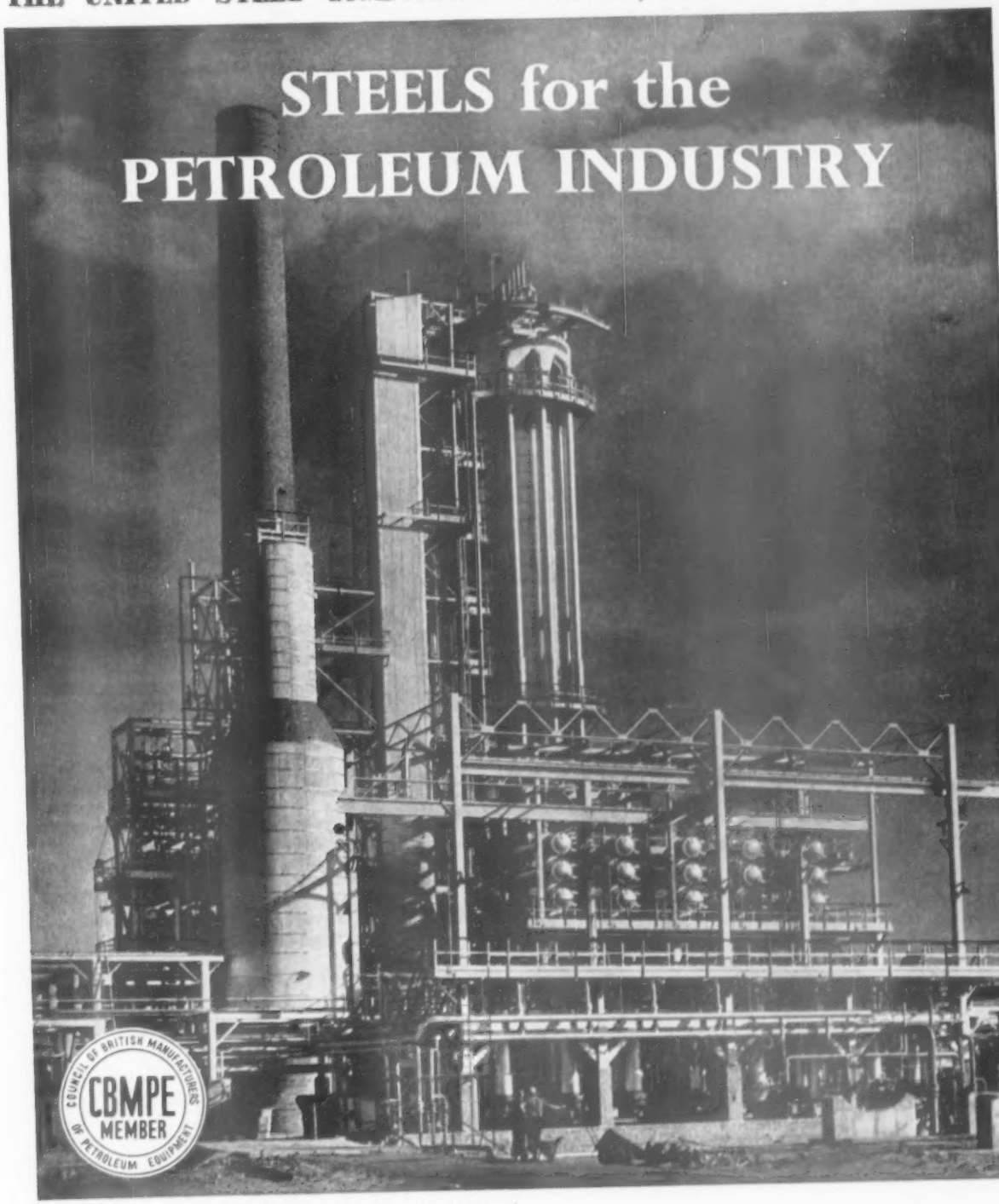

"A Symphony in Steel"—A British Petroleum Company photograph.

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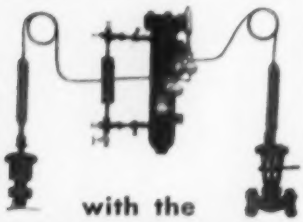

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Perkins County, the same firm is drilling below 4,555 ft. at the 1Breder in SE SE SE 33-12n-37w. Location is 12 miles northeast of the town of Grant, Neb.

The 1 Robertson is in NW NW NW 24-8n-37w, 10 miles northeast of Imperial.

Show Reported at Kimball County Wildcat Test

Maxey Drilling Co. reported an oil show at its 1 Evertson, C SE NE 30-14n-55w, Kimball County. Recovery was 9 ft. oil, 90 ft. oil-cut mud and 50 ft. of oil and gas-cut mud on drill-stem test of the "J" sand at 6,400-25 ft. Total depth is 6,481 ft.

New Book

"Resume of Rocky Mountain Oil and Gas Operations for 1955." Published by Petroleum Information, 1640 Grant Street, Denver.

The pace of the Rocky Mountain oil and gas industry, with ever-increasing drilling, leasing, and total exploration, has made imperative a reduction in size . . . though not in material, scope or completeness . . . of this Resume.

This is the 26-annual issue of the Resume. The book points again to the stature the industry has assumed during recent years. Economics of the regional industry has vitally affected each of the Rocky Mountain states and has become a potent consideration in appraisal of the national industry.

The impact of the region on the nationwide oil and gas industry has increased out of proportion to the percentagewise amount of the drilling, production and other phases of the industry which has been accomplished within the region.

It becomes ever more apparent that as the search for oil and gas continues, with increasing costs for reserves, exploration, drilling, and producing, that basic information is essential. The Resume is a complete history of 1955 in the Rocky Mountains. The authors thank the industry's help in compiling the Resume.

Copies of this fine work may be ordered from Petroleum Information, 1640 Grant Street, Denver.

Guide Books Available

The Billings Geological Society has been publishing annual field conference guide books since 1950. Included in them are technical papers on geological problems of the general areas encompassed by the field trips for which the guide books were written.

The Billings Geological Society has on hand copies of each of the various guide books and its agent for distributing them is the Northwest Geological Service, whose address is 807 Grand Avenue, Billings, Mont. The first five guide books are being sold in one package to schools and libraries. The sixth guide book has not yet been included in a package arrangement. Areas covered are in or adjacent to Montana and are as follows:

1950—The Crazy Mountain Syncline.

1951—Central Montana.

1952—Black Hills and Williston Basin Region.

1953—The Little Rocky Mountains.

1954—The Pryor Mountains and Northern Big Horn Basin.

1955—Sweetgrass Arch, Disturbed Belt.

It may not be generally known by schools and libraries that these valuable guide books can be secured as a unit at a price less than normally charged for such scientific publications.

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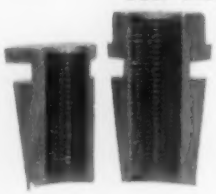

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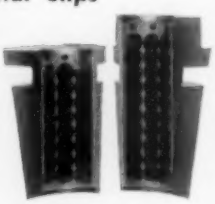

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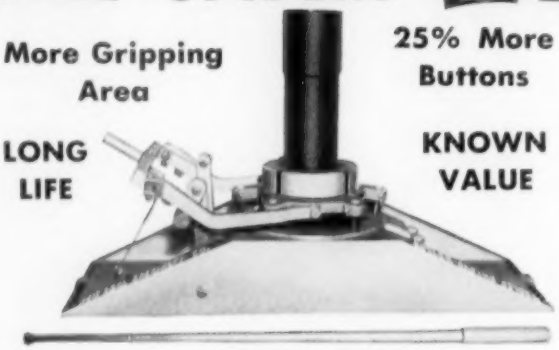

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ARKANSAS

Clear Creek Discovery Completed in Lafayette

Jones-O'Brien, Inc. completed the 1 Baker estate, discovery well of Clear

Creek field in Lafayette County, 25-15s-23w.

The well pumped 75 bbl. of 16°-gravity oil per day from perforations in the Tokio sand at 2,432-35 ft.

New Pay Discovery Finaled at McKinney Bayou

Milton Crow, Inc., Christmas, et al. opened Glen Rose sand production in McKinney Bayou field at the 6 Parks, C SW SW SE 14-16s-26w. The well flowed 144 bbl. of 32°-gravity oil per day on ⅞-in. choke from perforations at 3,368-73 ft.

Beech Creek Field Adds Cotton Valley Production

Tandem Drilling Co. et al. 1 Burdine, C SE SE 28-18s-16w, ¾ mile northeast of Wesson, is a Cotton Valley discovery for Union County's Beech Creek field.

The well flowed an estimated 10 bbl. of oil per day by heads with no water. Production is from perforations at 6,609-18 ft. Location is ⅜ mile northwest of abandoned Beech Creek field.

WEST TEXAS-NEW MEXICO

SOUTHEAST NEW MEXICO

Fourth Pay Zone Indicated At Lea County Test

Cabot Carbon Co. 1 Howard Fleet, wildcat in NE SE 35-13s-37e, Lea County, tested oil from its fourth prospective section. This well has attracted considerable attention, being on "trend" between Denton and Gladiola fields.

The latest zone in 1 Fleet to show oil was the Devonian. Others have been the Wolfcamp, Pennsylvanian and Mississipian.

A 3½-hour test in the Devonian at 12,313-80 ft. had gas in 2 hours. Re-

Cabot Carbon's multi-pay prospect in Lea County flowed 22 bbl. of oil in 1 hour on its latest drill-stem test of the Devonian, from 12,380-12,502 ft. Flowing pressure was 1,875-2,550 psi.

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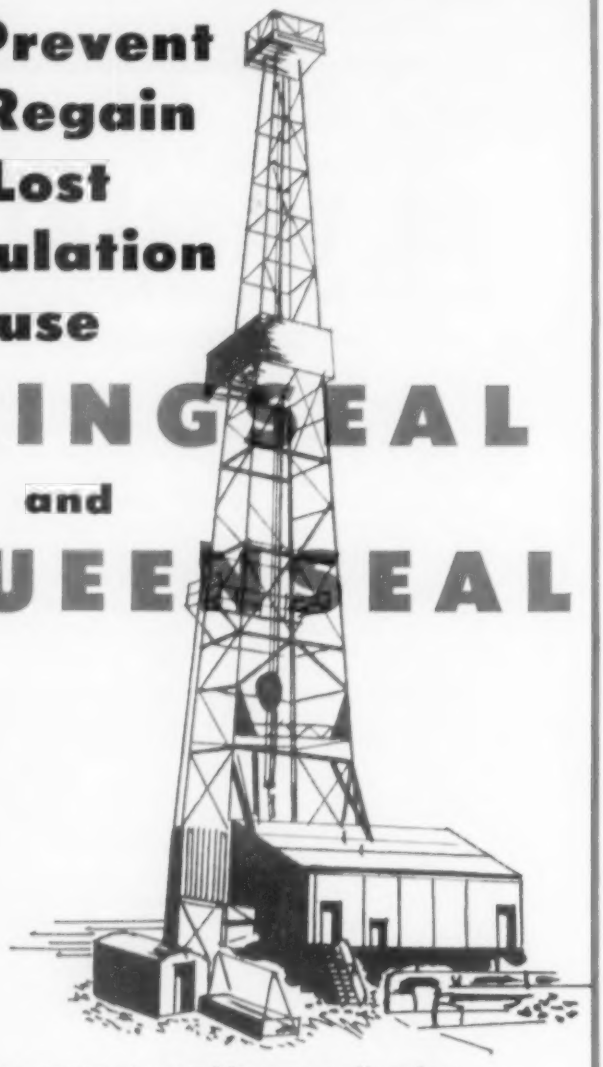

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covery was 1,400 ft. of water blanket, plus 360 ft. of oil, with no formation water. Flowing pressure was 675 psi. and 30-minute shut-in pressure reached 4,860 psi. Operators continued drilling below 12,417 ft.

Other pays . . . A 2-hour drill-stem test at 11,533-11,615 ft., tentatively identified as the Mississippian, recovered 1,770 ft. of clean oil.

Flowing oil was developed on a test in the Pennsylvanian at 10,652-10,727 ft. and a small amount of free oil was developed on test at 10,734-60 ft. The flow gage was 34 bbl. of oil in 30 minutes.

Following a test in the Wolfcamp at 9,893-9,970 ft., the well unloaded 2,000 ft. of oil.

Location is ⅜-mile southwest of Wolfcamp production in King pool.

Wolfcamp Extension At Atlantic Well

Atlantic Refining Co. 1 Joe Price, 31-15s-35e, 2 miles north of Townsend field and 1½ miles southwest of a new Wolfcamp area, flowed 24 bbl. of oil in 1 hour on drill-stem test at 10,466-10,562 ft. On the test, oil and mud surfaced in 20 minutes. The flow was through ⅝-in. choke. Oil in the pipe was reversed out and drilling continued.

Pennsylvanian prospect . . . D. D. Feldman Oil & Gas Co. 1 Elliott, 27-11s-38e, reported recovery of oil on drill stem test of the Pennsylvanian at 9,450-85 ft. On the 2-hour test, gas surfaced in 40 minutes. Recovery was 210 ft. of heavily oil and gas-cut mud; 1,640 ft. of very heavily oil-cut mud and 180 ft. of mud-cut oil. Flowing pressure was 300-750 psi., and shut-in pressure 3,200 psi. Operators drilled ahead. Location is 5½ miles northeast of Gladiola field.

WEST TEXAS

Texas Pacific Well Makes High Potential

Texas Pacific Coal & Oil Co. has completed its 1 Jacobs as a 1,368-bbl. Ellenburger discovery. This new opener is 11½ miles north of McCamey in Upton County, and about 3 miles west of the prolific King Mountain Ellenburger field.

Daily potential was pabed on a 6-hour flow of 342 bbl. of oil through 18/64-in. choke. Perforations were from 10,520-10,620 ft., after washing with 1,000 gal. of mud acid. Gravity was 49°, gas-oil ratio 211:1 and flow-

ing tubing pressure 925 psi. with packer on casing.

Top of the Ellenburger was 10,470 ft., on elevation of 2,936 ft. The well also indicated production from the Devonian Fusselman and Permo-Pennsylvanian.

Rapid field development set . . . Locations have been made for four offsets to I Jacobs. Texas Pacific will drill a southeast offset as the 2-2-Jacobs; Wilshire Oil Co. has scheduled two locations, and Lone Star Producing Co. has one offset planned.

Hockley test completed . . . Honolulu Oil Corp. 19-B Ellwood, long-testing Canyon dolomite discovery 6 miles north of Smyer, wound up with a daily flowing potential of 1,309 bbl. of 38° oil. Production was through 20/64-in. choke, from perforations at 9,630-72 and 9,684-9,702 ft. Tubing pressure was 325 psi. and gas-oil ratio was 111:1.

Reagan County discovery . . . Texas Gulf Producing Co. 1-S University, 7-11-University Lands, has been assured of Ellenburger production. The wildcat, located 2 miles west of the town of Big Lake, flowed 200 bbl. of oil in 24 hours from perforations at 9,409-45 ft. Top of the Ellenburger was 9,405 ft., on elevation of 2,702 ft. Operators were acidizing for further tests.

GULF COAST

SOUTH LOUISIANA

St. Rose Wildcat Uncovers New Gas-Condensate Area

California Co.'s new discovery well near St. Rose, 18 miles up the Mississippi River from New Orleans, in St. Charles Parish, flowed 41 bbl. of 53.7°-gravity condensate with 2,116,000 cu. ft. of gas per day through ¾-in. for its potential gage. Flowing pressure was 2,950 psi.

Drilled to 11,000 ft., the well is

Location (indicated by arrow) of California Co.'s new gas-condensate discovery in St. Charles Parish.

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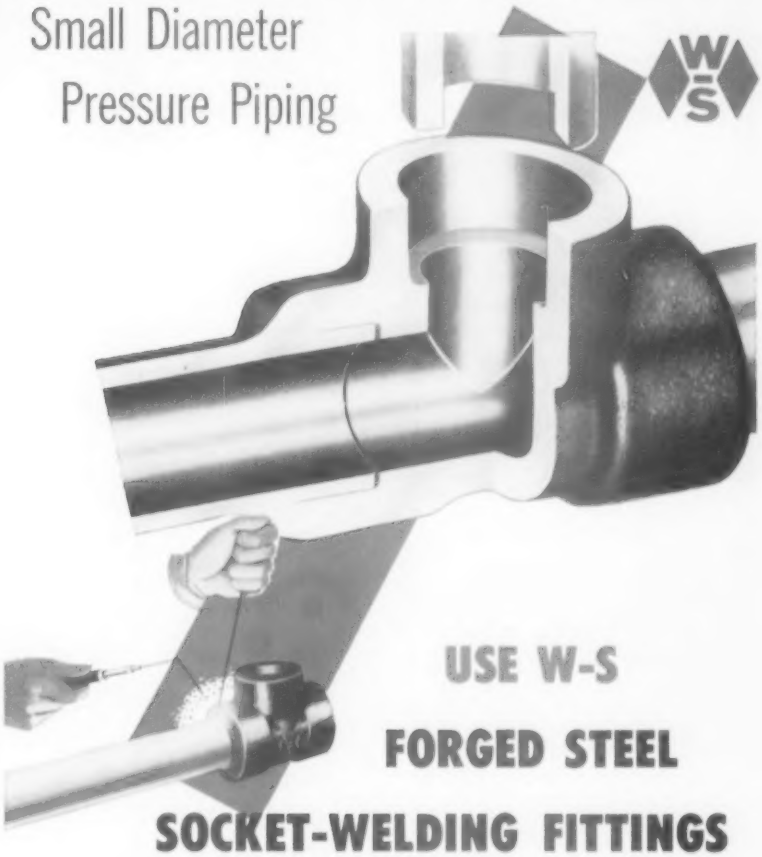

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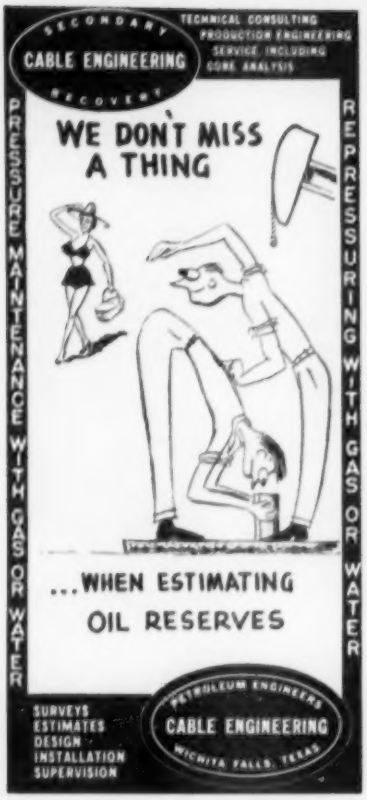

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productive from casing-perforated interval at 8,266-78. It previously had tested a deeper sand, perforated at 10,308-10,313 ft., from which it flowed at the rate of 108 bbl. of net oil.

Location is about 3½ miles northeast of St. Rose field, and a recently completed good oil discovery by F. A. Callery just north of Luling townsite. The latter well, bottomed under the Mississippi River, is productive from sand at 12,290-12,300 ft.

New Beauregard Field Is Second in Three Weeks

Sunray Mid-Continent Oil Co.'s new discovery well 7½ miles northwest of DeQuincy, in southern Beauregard Parish, is rated good for 1,200,000 cu. ft. of gas per day with condensate recovery of 60 bbl. per 1,000,000 cu. ft. The well is the company's 1 Lutcher-Moore, bottomed at 9,020 ft., cased to bottom, and perforated at 8,630-32 ft.

It is southern Beauregard Parish's second discovery completion during the past three weeks. The first was by General Crude Oil Co. and associates at their 2 Lutcher-Moore, 3 miles west of DeQuincy. It was productive of oil from perforations at 9,193-9,200 ft.

Oil Production Indicated In Erath Extension Test

Testing is under way at an indicated oil-discovery well in the Erath area, eastern Vermilion Parish. The well, 1 Rose, drilled for Tide Water Associated Oil Co., is about 4½ miles southeast of Abbeville, and about 2 miles north of production at Erath.

Hole was drilled to 14,000 ft., and has casing run to 13,496 ft. During initial tests through 5/32-in. choke flow was at the rate of 360 bbl. of 28.2°-gravity oil per day.

Second Sand Produces in Chenier Perdue Discovery

Lamson, Bennett & Cole and associates have opened a deeper sand in their new discovery well in the Chenier Perdue area northeast of Creole townsite, in southern Cameron Parish.

The well, 1-J Miami Corp., is dually completed. First completion, last December, was at 9,624-28 ft. with a potential of 2,500,000 cu. ft. of gas and 67.5 bbl. of 46.7°-gravity condensate per day through an X-6 choke.

The new completion is from perforations at 10,004-08 ft. with flow through tubing. Production through variable chokes was at the rate of 62.48 bbl. of 54°-gravity condensate with 2,343,000 cu. ft. of gas per day. Pressure was 3,360 psi.

Productive Area Spreads At Lake Washington Dome

Another major extension is being chalked up for the already widely spread Lake Washington field in the delta marsh area of Plaquemines Parish.

It is by John W. Mecom and associates at their 2 Bay Long Unit 1, off the southwest flank of the big dome. Nearest production is 2 miles northeast around the dome.

The well was drilled to 11,692 ft. Liner, cemented on bottom, is perforated at 10,917-22 ft. Flow through ⅛-in. choke was at the rate of 227 bbl. of 15°-gravity oil per day, plus about 20 per cent sediment and water.

In a previous test with perforations at 11,222-230 ft., the well produced at the rate of 2,650,000 cu. ft. of gas and 48 bbl. of 42.2°-gravity condensate daily through 5/32-in. choke. The 11,200-ft. zone was squeezed off to complete the well in the oil-bearing sand.

Location is 10 miles southwest, and on the opposite side of Lake Washington dome, from the world's deepest test. Mecom also was a partner, with Richardson & Bass (operator) and Freeport Sulphur Co., in the drilling of that test 5 miles off the northeast flank of the dome. It reached a depth of 22,570 ft., and now is attempting to test oil and gas showings encountered in sands below 2,000 ft.

Second Pay Zone Opened New Cameron Parish Field

Frankfort Oil Co.'s second well in its recently discovered Second Bayou field in the coastal marshes of southwestern Cameron Parish is opening a new pay zone, about 850 ft. shallower than that of its discovery well.

The newly completed well, 2 Lutcher-Moore, is 1,800 ft. northeast of the discovery well. Its pay is perforated at 12,012-32 ft., and produced at the rate of 2,572,000 cu. ft. of gas and 32 bbl. of 46.7°-gravity condensate per day through 3/16-in. choke with pressure of 4,500 psi.

The discovery well, completed last August, produces gas and condensate from perforations at 12,869-82 ft.

TEXAS GULF COAST

DeWitt County Discovery Opens New Wilcox Field

Magnolia Petroleum Co. has completed its new oil-discovery well, 1 Roeder, 2½ miles northeast of Nordheim, in southwestern DeWitt County. Flow, on completion gage through 5/32-in. choke, was at the rate of 141.66 bbl. per day with pressure of

575 psi., and gas-oil ratio of 1,585 cu. ft. per barrel. Oil-gravity was 48.8°. The discovery is designated as Roeder field.

Production is from lower Wilcox sand with perforations at 9,322-29 ft. Hole was drilled to 10,004 ft. and plugged back to 9,420 ft.

Magnolia recently took over deepening of the test on a deal with Jake L. Hamon. Its location is about 5 miles southwest of Yorktown.

Barb-Mag Production Moves Around Moore's Field Dome

The new Barb-Mag field, off the northeast flank of the old Moore's (Orchard) salt dome field, in Fort Bend County, got a 1-mile northwest extension with the completion by Sun Oil Co. of a good oil producer at its 1 Simmons.

The new well is 1 mile east of Orchard townsite and about 1½ miles north of production at Moore's dome. It is completed in the Barb-Mag First Yegua sand with perforations at 8,263-67 ft., about the same depth as in the field.

Flow on completion gage through an XX-39 choke was 112 bbl. of 39.5°-gravity oil per day. Pressure was 275 psi. and gas-oil ratio 1,125 cu. ft. per barrel.

Sun is drilling on its second well, 1 Jalowy, due-west extension.

Barb-Mag field was opened in July 1955 by Russell Maguire. Including the discovery well, Maguire, until now the only operator, has completed four producers. Three are oil wells. The other is productive of gas and condensate with completion in two new zones.

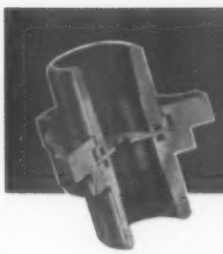
SOUTHWEST TEXAS

Zavala County Discovery Revives Plumley Gas Area

Production in the Plumley area of western Zavala County is being extended about 1½ miles northeast by a new Navarro-sand discovery by Shell Oil Co.

The extension well, 4 Plumley, is the first activity in the area since 1953. It is good for 7,700,000 cu. ft. of gas per day with its Navarro pay perforated at 2,401-11 ft. Total depth is 2,550 ft.

Shell's discovery well, 2 Plumley, was completed in February 1953 with open-flow potential of 22,000,000 cu. ft. of gas per day with pay at 2,220 ft. Its first test, 1 Plumley, west of the discovery gasser, was drilled to 14,500 ft. It encountered oil shows in Navarro sand at 2,140-50 ft., and also in several deeper zones, but was abandoned,



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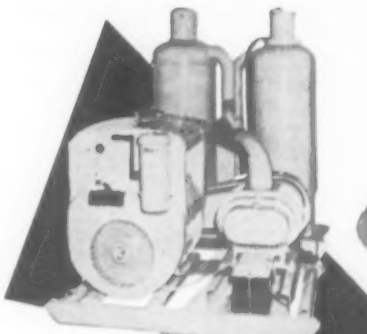

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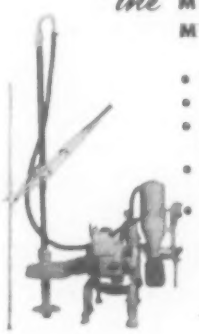

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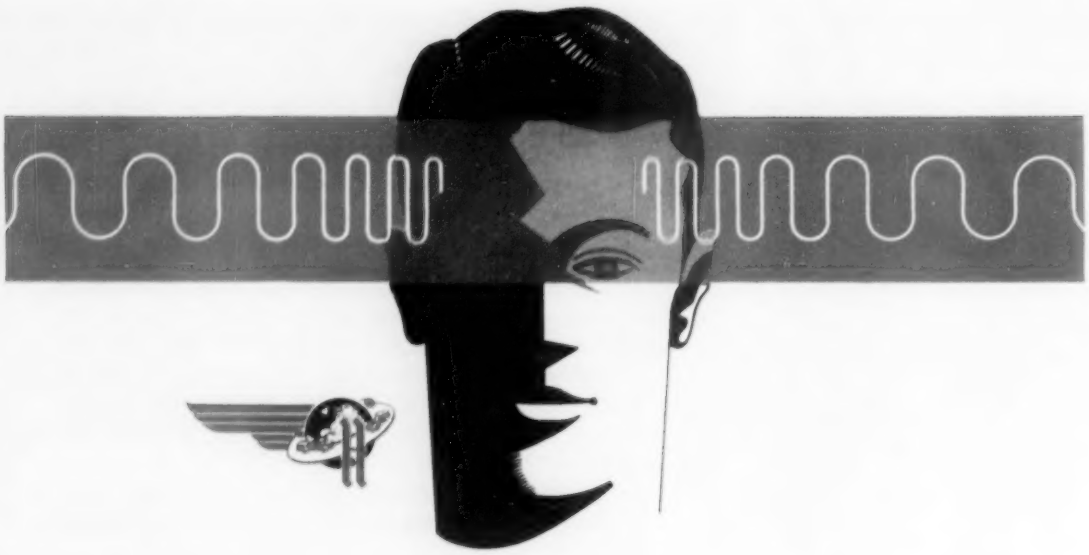

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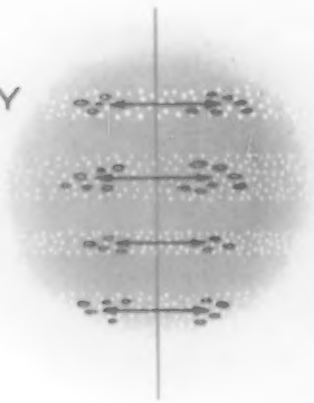

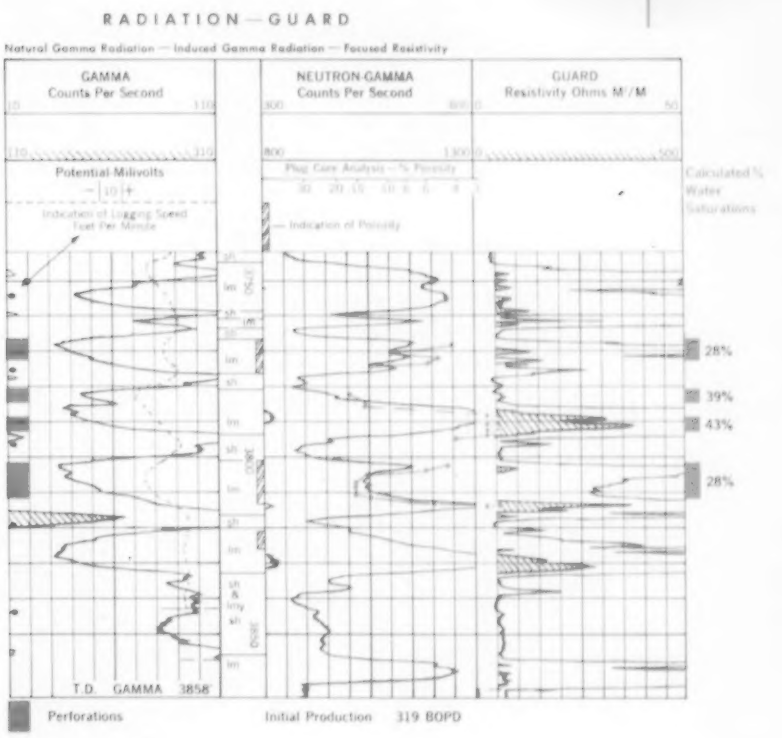

Red trace is neutron curve derived from plug core analysis as compared to Halliburton recorded neutron-gamma curve.

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HALLIBURTON ELECTRICAL WELL SERVICES

in September, after an unsuccessful fishing job.

Shell's 3 Plumley, southwest of the discovery well, and also No. 1, confirmed the discovery. It was completed in April, that year.

The area is 15 miles northwest of Delmonte. It is less than 1½ miles from the Maverick County line, and 12 miles north of the Dimmit County line, at the far-southwestern extremity of the Navarro trend of play.

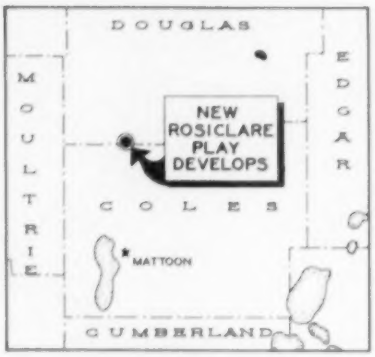
EASTERN INTERIOR

ILLINOIS

Rosiclare Play Develops In Coles-Douglas County

One of the best oil plays since last year's Saline County boom is developing 10 miles north of Mattoon on the Coles-Douglas County line. The discovery well of the fast-growing producing area was John E. Wheeler 1 Skinner in SE SE SW 18-14n-8e. It flowed 408 bbl. per day from the Rosiclare at 1,786-94 ft. after fracturing.

In 12 sections of the Cole County area, 32 oil producers have been completed since the drilling development



A new play of considerable importance is developing around the Coles-Douglas County line, 10 miles north of Mattoon, Ill.

began in the latter part of 1955. Some of the wells have had initial potentials as high as 1,200 bbl. per day, flowing. Most produce from the Rosiclare sand. Five gas wells in the area are producing. The biggest one made 24,000 M.c.f. per day.

GREAT LAKES

MICHIGAN

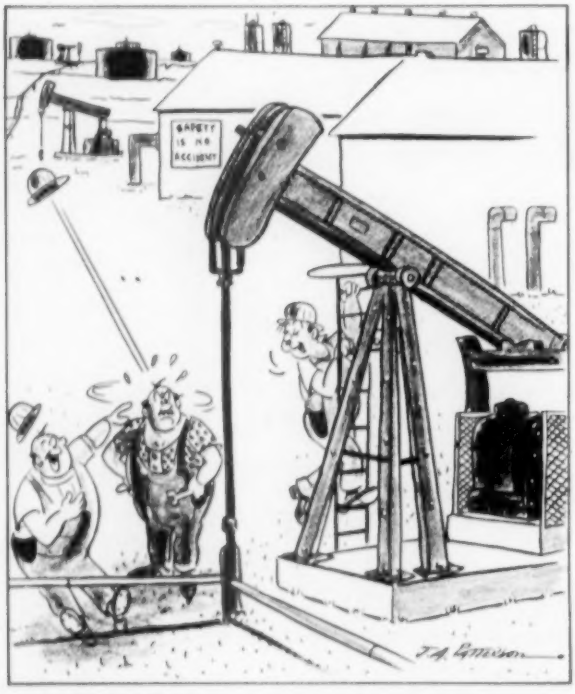
The Reynolds-Reed City zone oil pool took on even greater importance

King Oil Co. announced that it would now keep two rigs active in an effort the past week as the most southeasterly well drilled in the field logged pay objective structurally higher than any other well drilled to date in the pool and flowed oil to pits within 10 minutes after pay was tapped. Oil beat cable tools to the surface after drilling was suspended.

This new well, drilled by McClure, Swan-King, Basin Oil Co. and G. Ackerman at the 1 Crimmins, SE SE NE 12-12n-10w, Reynolds Township, logged Dundee top at 3,225 ft. Pay was logged at 3,320-20½ ft.

Coupled with the William Cline 1 Michigan Consolidated Gas Co., SE NW SE 6-12n-9w, which extended field 1 mile due east and into Winfield Township, the 1 Crimmins well appeared to assure at least 600 additional acres for the drill in this field. Bulk of the acreage which appeared to be proved by this new producer is owned by the discovery group, Swan-King Oil Co., et al.

Reynolds field, discovered about 2 years ago, has been developed on a 40-acre well spacing pattern. Discovery group had completed nine Reed City oil wells and two Traverse oil wells prior to the Crimmins well. Pool was developed with one rig operating. Swan-



"No, I don't think th' company is payin' you what you're worth, Grizzwall—they can't violate th' Minimum Wage Law, you know."

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to keep up with offset requirements. This group has at least eight forced 40-acre offset to drill now. The Reynolds field appears to be the most important Michigan strike in the past 10 years.

Two outpost tests were announced as the result of these new developments.

John Neyer was reported to have location staked for an outpost test in the SE SW NE 8-12n-9w, while Union Development Co. will start drilling within 2 weeks at an outpost in the SE NW NW 5-12n-9w.

Best producing wells in Reynolds field have been voluntarily restricted to not more than 85 bbl. of oil daily. This plan will be continued. There is no state oil allowable set for this field, but the 40-acre well spacing pattern has been established by order from the supervisor of wells.

Successful Wildcats

ALBERTA

Gulf 13-11 Halliday, LSD 13, 11-28-14w4. TD 4,860 ft. PB 3,190 ft. Viking gas well.

Union 12-17 Red Earth Creek, LSD 12, 17-87-8w5. TD 4,797 ft. Granite wash oil well.

Richfield-C. P. R. 7-7 Bratland, LSD 7, 7-42-12w4. TD 3,250 ft., Blairmore gas well.

ARKANSAS

Lafayette County: Jones-O'Brien, Inc. 1 Baker estate, ⅞ mile northeast of Northeast Stamps field in 25-15s-23w. IPP 75 BOPD, no water, 16°, perfs. Tokio 3,432-35 ft. TD 2,506 ft. (Discovery of Clear Creek field).

Miller County: Milton Crow, Inc.-Christmas et al 6 Parks, C SW SW SE 14-16s-26w. IPF 144 BOPD, Glen Rose perfs. 3,368-73 ft., 32°, TD 4,100 ft. (New pay in McKinney Bayou field).

CALIFORNIA

Kern County: The Texas Co. 2 Di Giorgio C, NW SW 11-31s-29e, BOPD 7, Perfs. 4,807-5,102 ft., 34.6°-gravity, 8/64-in. choke, TD 5,226 ft. (New pool discovery on southeast flank of Mountain View field.)

SOUTH LOUISIANA

Acadia Parish: Union Oil & Gas Corp. 1-B Gueno et al, 51-8s-2e. Shut-in gas well, IP 6,000 M.c.f. daily (estimated), various chokes, perforations 14-780-84 ft. TD 15,640 ft. (New pay—northwest flank Branch field).

Humble Oil & Refining Co. 1 Habetz, 15-9s-1e. IP 303 BOPD, 8/8-in., perforations 11,125-37 ft. TD 15,020 ft. (New pay in Bayou Wickoff field).

Allen Parish: F. E. Jameson 1 LeBlanc, 11-6s-6w. IP 89.04 BOPD, ⅛-in., 48°, perforations 5,408-12 ft. TD 5,500 ft. (New field—LeBlanc).

Beauregard Parish: General Crude Oil Co. and others 2 Lutcher-Moore, 16-7s-11w. IP 120 BOPD, 9/64-in., 39°, perforations 9,193-9,200 ft. TD 10,550 ft. (New field—Cowards Gully).

Sun Oil Co. 1 Hodges, 17-6s-8w. Shut-in gas well, no gage, perforations 7,203-05 ft. (Frio). TD 9,707 ft. (New pay in Fayette Sour field).

Magnolia Petroleum Co. 1 Wingler, 11-6s-9w. IP 185 BOPD, 7/64-in., perforations 9,049-54 ft. TD 9,309 ft. (New pay in Wild Cow Creek field).

Lafourche Parish: California Co. 1 Calco-Superior-Jones et al, 60-17s-21e. IP 184 BOPD, 7/64-in., 33.8°, perforations 10,-556-68 ft. and 10,578-83 ft. TD 11,780 ft. (New pay in Cutoff field).

Terrebonne Parish: Humble Oil & Refining Co. 4-A OCS 019, Block 54, South Timbalier area, Gulf of Mexico. IP 143.34 BOPD, ⅛-in., 35.9°, perforations 7,812-30 ft. (New pay in South Timbalier Block 54 field).

MICHIGAN

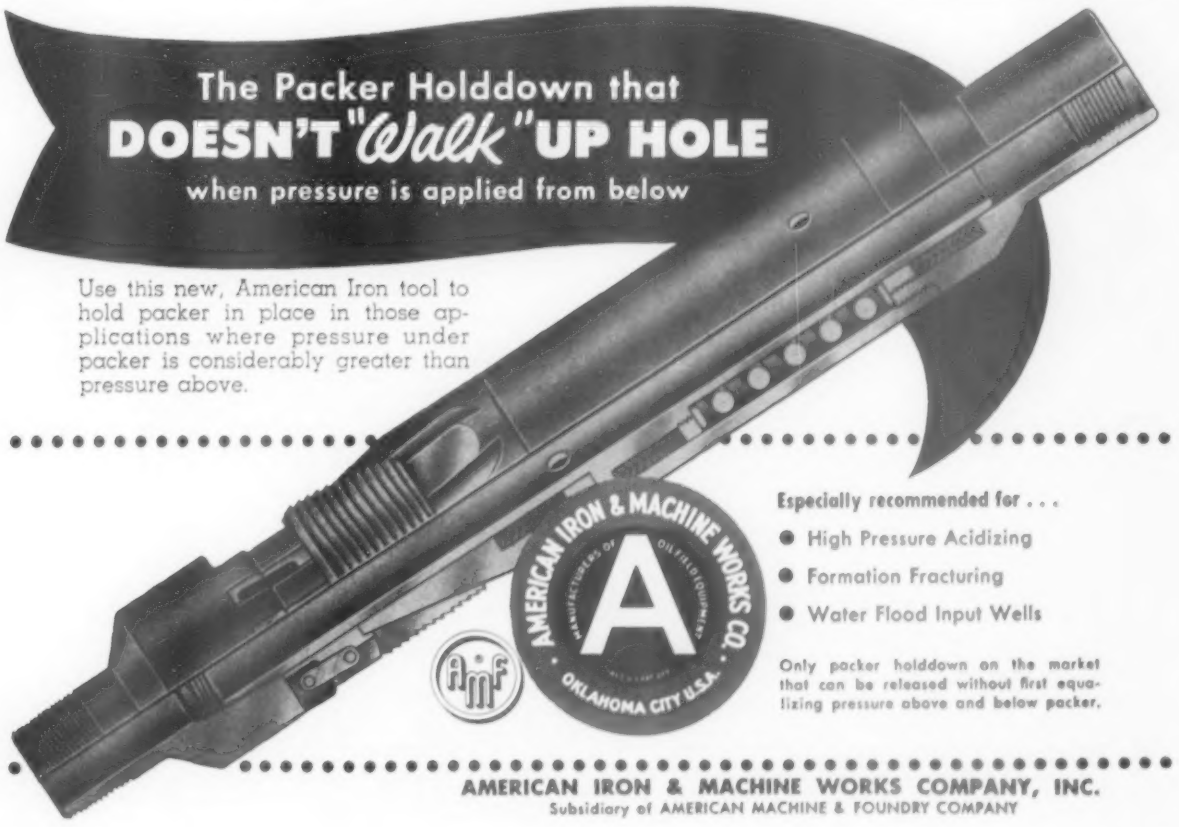
Montcalm County: William Cline 1 Michigan Consolidated Gas Co., SE NW SE 6-12n-9w. IPF 100 BOD, restricted from Reed City zone pay, 3,362-36 ft. Dundee 3,267 ft., TD 3,363 ft. (Extends Reynolds pool 1 mile east.)

NORTHWEST NEW MEXICO

Rio Arriba County: Amerada Petroleum Corp. 3 Jicarilla-Apache "A," NW SE SW 23-25n-5w. IP 330 M.c.f. of gas and 88 BOPD, Graneros; IP 559 M.c.f. of gas from La Ventana, SICP 1023 psi. Dual completion, new pay discovery. TD 7,505 ft. Morrison.

OKLAHOMA

Beaver County: O. H. Parker 1 Sleeper, C NW SE 25-2n-23eCM. IPF 8-10 BDPD, 7,652-72 and 7,688-7,700 ft. IP 17,772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M.c.f. of gas per day. TD 7,761 ft. (Gas-distillate discovery).

Bryan County: Pasotex 1 State, SE NW SW 25-6s-8e. IPF 34 BCPD, 2,900 M.c.f. of gas per day, McLish sand 9,640-9,712 ft., 18/64-in. choke, 62.2°. TD 10,676 ft. (Gas-condensate discovery).

Payne County: Brown & Drew 1 Aberdeen, 1 mile southwest of Northwest Ingalls field, SE SW NE 20-19n-4e. IPP 30 BOPD, Red Fork sand 3,679-86 ft., 36°, TD 3,683 ft. (Oil discovery).

Woods County: The Texas Co. 1 McAntire, NW NW NE 20-25n-15w. IPF 5 BOPD, Layton sand 5,471-78 ft., 13/64-in. choke, 50.2°. TD 7,785 ft. (Oil discovery).

OHIO

Perry County: Ohio Fuel Gas Co. 1 Lola Noyes, Sec. 9, Hopewell Township. IP 1,120 M.c.f. daily and 48 bbl. oil. Clinton 2,830-51 ft. TD 2,858 ft.

TEXAS GULF COAST

Colorado County: Trice Production Co. 1 Gargia, et al., I&GN Sur. 56, A-284. IP 44,000 M.c.f. daily, open-flow potential, GLR 16.6 M.c.f. per bbl., 63°, perforations 8,527-37 ft. TD 9,300 ft. (New field, or extends West Rock Island area.)

Matagorda County: Crown Central Petroleum Corp. 1-E Denman Kountz, et al., I&GN Sur. 9, A-317. IP 39.44 BOPD, 3/32-in., 41.7°, perforations 7,130-32 ft. TD 8,788 ft. (New field.)

San Patricio County: J. P. Petkas 1 Crouch, I&GN Sur. 174, Sec. 1. IP 1,500 M.c.f. daily, 5/32-in., dry gas, perforations 4,692-97 ft. (Vicksburg). TD 4,734 ft. (New field.)

SOUTHWEST TEXAS

Jim Hogg County: O. W. Killam 1-A Marsh, Los Cuevitas Grant, Share M-6. IP 1,200 M.c.f. daily, open-flow potential, dry gas, perforations 2,393-2,400 ft. (Government Wells sand). TD 2,445 ft. (New field.)

Starr County: Appell Drilling Co. and M. E. Andrews 1 Simpson, Sur. 284. IP 51.04 BOPD, 7/32-in., 45°, perforations 4,141-45 ft. (Hockley). TD 4,148 ft. (New field—Appell Hockley.)

Wilson County: Richard I. Kaye 1 Webb, Manuel Contis Sur. 375, A-68. IPP 95 BOPD, 36°, perforations 2,548-58 ft. TD 2,622 ft. (New field.)

EAST TEXAS

Rusk County: Sinclair Oil & Gas Co. 1 Alsup, Walker Pettet Sur., A-624, 3 miles SE Good Springs. IP 27,500 M.c.f. gas, Woodbine 3,760-66 ft. TD 3,851 ft. Ground elev. 431 ft., shut-in TP 2,268 psi.

NORTH TEXAS

Clay County: LaGorce Oil Co. 1-B Howard, Blk. 45, T. J. Belcher Subd., 2 miles SE Halsell. IP 129 BOPD, 16/64-in., TP 40 psi., 40°, GOR 400, pay 4,120-28 ft. TD 4,710 ft.

Wise County: Christie, Mitchell & Mitchell 1 Tarrant County Waterboard, J. G. W. Clayton Sur., A-150, 4½ miles SW Chico. IP 61.5 BOPD, ⅜-in., TP 85 psi., GOR 1732, 41°, Atoka conglomerate 5,329-34 ft. TD 5,769 ft. Suggested name, Chico West, Atoka conglomerate.

WEST CENTRAL TEXAS

Nolan County: Rouark-Hooker-Hill 1 Kilgore, 115-1A-H&TC, 2 miles SE Maryneal. IPP 74 BOPD, 40°, GOR 200, Strawn 6,096-6,126 ft. TD 7,010 ft. Suggested name, South Maryneal-Strawn limestone.

Throckmorton County: Cannon Drilling Co. 1 McKnight, DL&C Sur., 10 miles SE Throckmorton. IPP 83 BOPD, 42°, GOR 310, Caddo lime 4,073-78 ft. TD 4,115 ft. NW extension.

W. M. Summers 1 Bloodworth, T. J. Griffith Sur., 10 miles NW Elbert. IPP 142 BOPD, 39.5°, GOR 600 Strawn sand 3,841 ft. TD 3,845 ft. New field name, Summers-Strawn.

WEST TEXAS

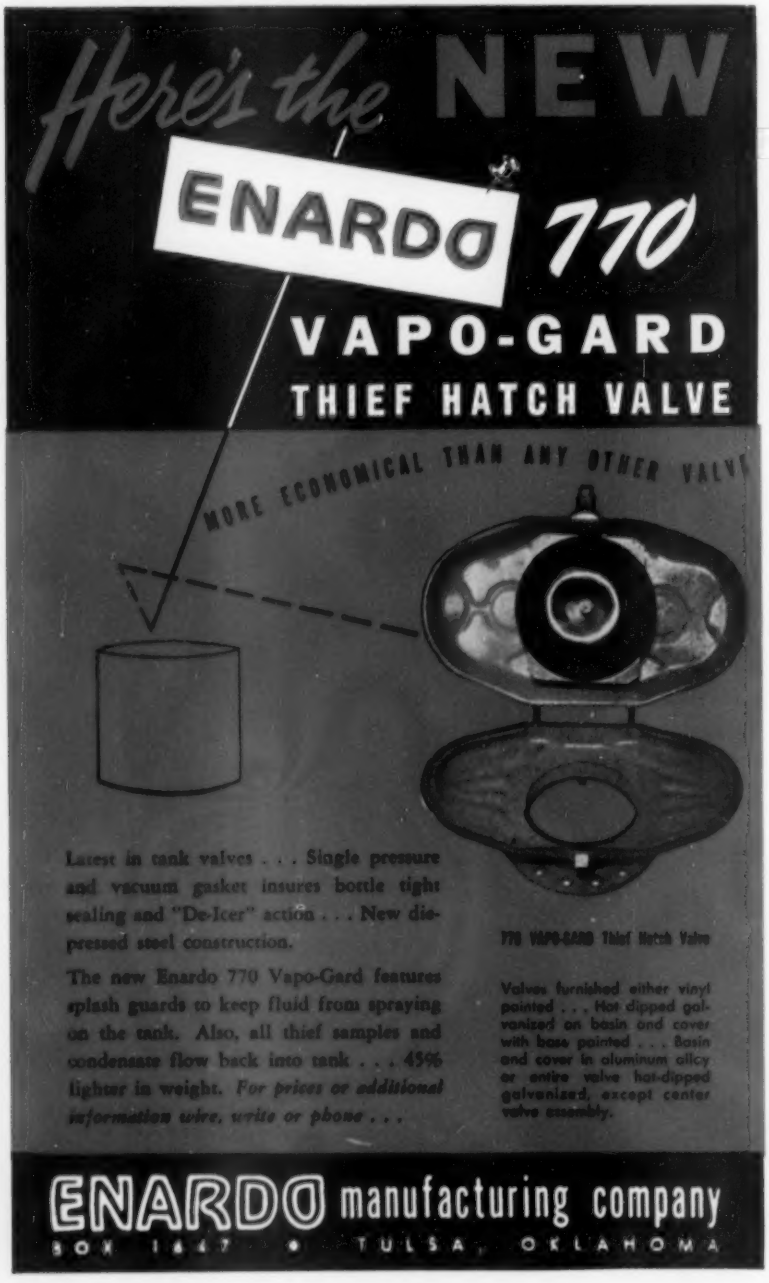
Borden County: Midwest Oil Corp. 1 Scott, 413-97-H&TC, 14 miles NE Gail. IP 237 BOPD, 8/64-in. and 10/64-in., TP 760 psi., GOR 684, 40°, perforated Strawn lime 8,072-78 ft. TD 8,368 ft., ground elevation 2,555 ft.

Crane County: Midwest Oil Corp. 1 Lillie Reed, 2-4 H&TC, 11 miles N Imperial. IP 169 BOPD, 17/64-in., TP 125 psi., GOR 461, 36°, top Waddell sand 5,922 ft., perforated 5,938-44 ft. TD 6,020 ft., ground elevation 2,440 ft.

Upton County: Gulf Oil Corp. 1-M McElroy ranch, 141-E-CCSD&RGNG, 12 miles SE Crane, Wolfcamp pay discovery in Cisco field. IP 314 BOPD, 12/64-in., TP 1,215 psi., GOR 956, 40.7°, perforated 8,905-9,220 ft. TD 13,180 ft., PB 10,196 ft. Elevation 2,773 ft.

UTAH

San Juan County: The Texas Co. 1 Navajo, C NW NE 23-40s-24e. IPF 1,704 BOPD, Paradox discovery, new field. TD 5,923 ft.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New L-W Skyhook Speeds Thru-Tubing Jobs

Through-tubing perforating and logging operations made eminently practical by Lane-Wells slim-hole equipment, now get a time—and trouble-saving assist from a highly portable sky hook which is now available in certain areas. This new Lane-Wells development takes the form of a vest pocket mobile mast that powers its own way into working position in a matter of minutes.

The big advantages of the so-called permanent-type well completions stem from the fact that logging and perforating operations (with Lane-Wells on the job, of course) can be carried on through tubing without the need of an expensive drilling or production-type rig and drawworks. Tools utilized in this service go through lubricators as long as 35 feet and against pressures as high as 3000 psi.

Previously, in the absence of a derrick, gin poles provided the means of supporting the lubricator over the well. Erection of gin pole and lubricator on a Christmas tree required a considerable amount of deft manipulation, several guy wires, and some hazard. The new mobile mast can be positioned by practically any car or truck, and one man at the controls can erect it in working position in 15 minutes.

Here are some more facts about the new mobile mast which should interest operators contemplating remedial or recompletion work through tubing:

1. The rig will support a straight-down pull of 11,000 pounds at a height of 30 feet.
2. The rig takes all columnar load off the lubricator.
3. No guide lines are required.
4. The motor used to raise and lower the mast can be used to raise and lower the lubricator and tools.
5. The gross weight of the complete unit is approximately 2700 lbs.
6. A five-horsepower gasoline engine, with spark-proof exhaust and insulated spark plugs, supplies the power.
7. Wheels do not support derrick load. These are automatically raised as the mast support is grounded and jacknifed.

For more details about this and other aspects of Lane-Wells through-tubing service, check E1 on the attached card.

Want More Information?

More information on items here will be sent to you gladly on request. A code number appears at the end of each article. For additional information about that item circle that code number on the reply card at the bottom of page 3. Just mail the card — we'll pay the postage.

EVER MEET AN "E" ZONE

or

How to Win Friends and Influence Formations

Omitting certain descriptive adjectives, some geologists call it a heavily cemented sand. But certain widening circles of production men call it an "E" zone.

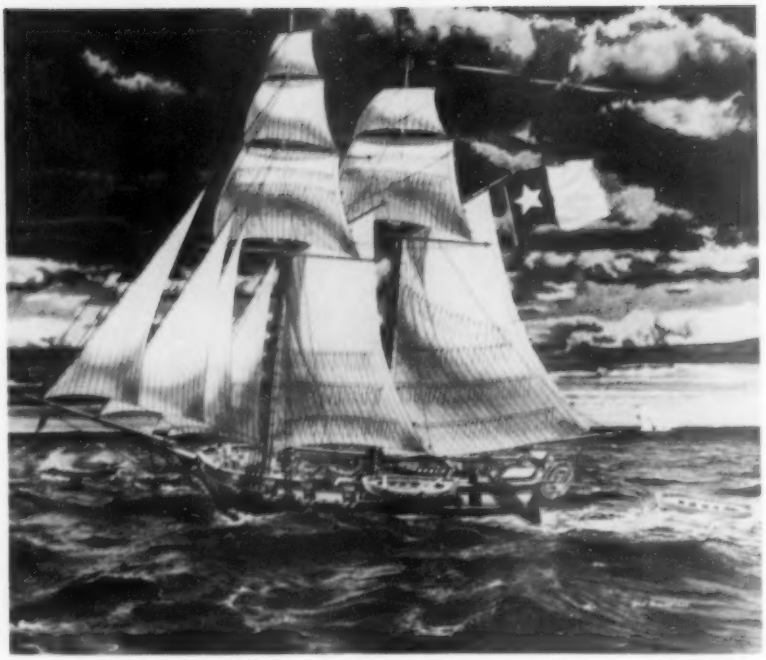
It's all very flattering. "E" zones are those potentially productive horizons which will respond to nothing short of perforating by the mighty Lane-Wells "E" Gun. This bullet perforator can put a hole through heavy casing, cement, and way, way out into the formation to create a drainage area unequaled by any other type of gun perforation. "E" Gun perforations give more than penetration; they create radial shattering — perforations on perforations, as it were—which multiply the chances of payoff production.

As a result of the "E" Gun's performance, operators in many areas are beginning to take another look at certain zones which have not produced according to expectations. In many such zones, the "E" Gun has made the difference between profit and loss on the whole operation.

Lane-Wells engineers can supply you with lots of detailed technical data on why the "E" Gun performs in such a spectacular manner. Briefly, it has to do with bullet design, powder charge, and the use of a solid bar stock gun of maximum strength. But you can get all this information by checking the right number and mailing the attached postal card. You will also find out that the shooting of this gun is as controllable as the keys of a piano. Each shot being individually fireable allows the operator a tremendous range of shot spacing — from 50 shots to the foot, to one shot in 50 feet.

Altogether these items add up to make one big shot that really produces — literally and figuratively. Check E2 on the attached card to bring you the low down on this high-up performer.

You, too, can win friends with "E's"!



A Ship of the Texas Navy!

This tops'l schooner, circa 1836-1843, aided the cause of the Lone Star Republic by harassing enemy supply vessels. Artist Fred Freeman rendered this painting from a model in the U.S. Coast Guard Academy. The photograph of the painting was supplied through the courtesy of the Scovill Manufacturing Co. of Waterbury, Conn.

ABSTRACTS — Current and Pertinent

HOW TO FIND OIL IN DRY HOLES Sometimes, that is. Atlantic Refining Co. has come up with a method of correlating water resistivity, formation factor, and electrical logs to indicate unsuspected oil possibilities in abandoned holes. E3

PETROLEUM GEOLOGY MADE EASY For the casual looker on. The American Museum of Natural History's Hall of Oil Geology in New York gives the whole picture of how oil is created, searched for, discovered, and produced. Realistic diorama models, and maps are used. E4

THROUGH TUBING OPERATIONS PAY OFF — BIG! Gulf chalks up a net saving of $171,087 in Louisiana through the use of permanent-type well completions. E5

DOLLAR SIGN SELLS CORROSION CONTROL TO MANAGEMENT. Technical data are fine, but results in dollars and cents wield the most influence with the top brass. Produce these and you are on your way. E6

SMALLEST ATOM SMASHER AIDS OIL SEARCH — Positive identification and location of oilbearing formations by Radioactivity Well Logging has been advanced by the development of a high energy source in the laboratories of Well Surveys, Inc. E7

HOW POROUS MY SANDS AND SHALY SANDS? Porosity in these formations may now be evaluated by Neutron and Gamma Ray Logs to an accuracy within practical requirements. E8

ANOTHER LANE-WELLS PLUS: 21-24% ADDED PENETRATION

Here's another plus that really pays off — bullet penetration increased by better than 20%! The how and why pays high tribute to the men who have to do with designing and creating Lane-Wells powder charges.

Ballistically, the story boils down to the following: Merely increasing the charge of high-performance powder would not solve the problem of gaining deeper penetration. More powder would mean higher peak pressures, pressures exceeding the boundaries established by safe operating procedures. So, the Lane-Wells staff produced an entirely new kind of powder, one which at no time creates excessive pressure, but one which maintains that pressure over a relatively long period of time. This is the new #7. It sort of gives the bullet a poosh way, way out there.

Tests by a major oil company confirm the story. Three bullets each were fired by the powerful #3 and the new #7 powders into targets made of casing steel and cement. The only difference between the targets was that the steel of the #7 target had higher tensile strength! Bullet penetration for the # 3 averaged 6.22". That for the #7 averaged 7.80". 'Nuff said. But if you really want to know more, check E9 on the attached card.

Do-It-Yourself Straddle Packer Proves Useful Breakdown Tool

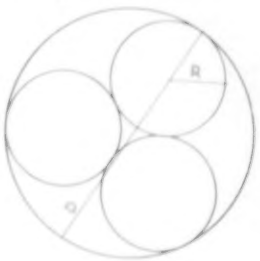
One of the neatest tricks in down-hole procedure concerns the use of a straddle packer to confine breakdown fluids to a specific set of perforations. What makes this particular packer application so attractive to the cost-conscious operator is that it involves the use of two regular-purpose Lane-Wells packers. No expensive special-purpose tools or complicated procedures are involved.

In fact, any reasonably competent drilling crew can put the straddle assembly together to suit the job at hand without leaving the shadow of the derrick. The tool pusher could just about do it all by himself, if he were so inclined. It consists of a BOCU packer and a Hydraulic Hold Down Tool on top and a BOC packer below. The two packers are separated by a length of perforated tubular goods depending upon the zone to be isolated. The combination, run on tubing or drill pipe, can be set and reset without ever coming out of the hole. It will handle any pressures safe for the casing from within, above, or below. Once the job is finished the assembly can be taken apart in a jiffy.

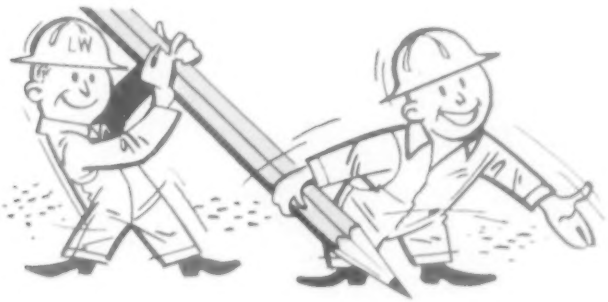
You can get formation breakdown work done with much more expensive equipment than the Lane-Wells Straddle Assembly. But if your boss is concerned about costs of such operations, you had better check E10 on the enclosed card.

Super Brain Breaker

Given three equal tangential circles circumscribed by a larger outer circle as in the diagram. Given the smaller circle radius R=15", determine the diameter, D, of the larger circle. This is not too super, provided you follow the right procedure.



Answer to the rod-in-the-hemispherical-bowl problem: 15.7% of the rod will project from the bowl.



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Complete information about the items appearing in this publication is available without charge to qualified oil company employees and oil well operators. Please fill out the forms completely, giving Company and Title as well as your address and indicate whether or not you want to be placed on the mailing list to receive more information on these subjects as it becomes available.

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Tomorrow's Tools—Today!

Meet B.P.'s Mr. John Bull . . .

. . . Jackson Has Worldwide Ties

WHEN Basil Rawdon Jackson becomes chairman of British Petroleum Co. April 1, he takes with him the good wishes of oil friends the world over.

In 35 years in oil, the genial Jackson has traveled to many far places with the same result: He did a competent job and left many friends behind.

For 15 years he represented his company in the United States where he became as well known as he is on the other side of the Atlantic. His American friends call him dynamic and typically British—Mr. John Bull himself—in appearance.

Jackson will succeed Lord Strathalmond as B.P. board chairman. And like his predecessor he has shared in piloting his company through bad times and good and through political upsets that nearly spelled disaster.

Nearly a Yankee . . . Jackson was born on this side of the Atlantic—but at St. John's, Newfoundland.

He passed part of his youth in Gibraltar and Trinidad, where his father, the late Sir Henry Jackson, was governor. He was educated in England and in the 1914-18 war served in France as an artillery officer.

The pattern of his life changed after the war. He married Marjorie Violet Warner, daughter of the late attorney-general of Trinidad. A few years later he abandoned law, which he had studied on leaving school, for industry. He joined the Anglo-Persian Oil Co., a predecessor of B.P., in 1921.

Jackson's activities centered in the production department in London until 1929. In that year he made his first visit to the United States and the following year was appointed to head B.P.'s newly opened New York office. His job was to deal with procurement and patents and to maintain contact with U. S. oil developments.

In 1934 Jackson accompanied the then chairman, Sir John, later Lord, Cadman, on a tour of company installations in Australia and the Middle East. He then was recalled to London for a challenging assignment.

World War II duties . . . The British Government had called for an oil exploration program in the British Isles. It was Jackson's job between 1935 and 1939 to discover the oil and develop the fields.

B.P.'s first British well was spudded in at Portsdown in 1936. By 1939 commercial production had been obtained just in time to become a small but invaluable addition to Britain's fuel supplies during the World War. B.P. is still the only commercial crude-oil producer in England.

The war brought feverish activity for both Jackson and B.P. Jackson returned to the New York office shortly after war started. In 1941 he was named one of the two British members of the Foreign Operations Committee. His duties included many difficult problems of wartime procurement.

The outstanding instance was building the alkylation plant at the Abadan refinery to manufacture avgas for the Allies. Its plant and equipment had to be obtained and shipped to Iran in a race against time. German U-boats sank several cargoes. But in the later stages of the war this plant produced up to 27,000 bbl. daily and was the chief supplier of the Allied air forces in the Middle and Far East.

Big blow in Iran . . . The postwar years were busy ones for Jackson. He stayed on in New York even after he was appointed to the B.P. board in 1948. In 1950 he spent several months in Iran, Kuwait, and Iraq, and in July of that year was elected deputy-chairman to Lord Strathalmond (then Sir William Fraser), whom he succeeds next month as chairman. This sent him back to London.

But storm clouds were gathering in Iran. And in May 1951 the storm broke. Premier Mossadegh nationalized the Iranian oil industry. In June Jackson headed a company mission to Teheran to try to negotiate a settlement. It met with the same failure as many subsequent attempts to negotiate with Mossadegh until he was deposed in 1953.

The temporary loss of Iranian oil forced Jackson and his colleagues to reorganize Anglo-Iranian without Iran.

They resettled displaced staff, reformed market supply lines, increased refining capacity outside Iran, and expanded crude production in other parts of the world. So thorough was their work that by the end of 1954 when the Iranian dispute was finally settled, the name of Anglo-Iranian was an anachronism. It was changed to British Petroleum. The firm has just finished its first year under that banner with further progress recorded in all branches of its operations.

Jackson has managed to cultivate interests outside his work in a busy lifetime.

He plays a fair game of golf and has an interest in paintings, especially floral and marine "old masters." Two fine eighteenth century seascapes hang on the walls of his office in Britannic House. More are in his London apartment in Kensington, overlooking Hyde Park.

Paul M. McFadden has been transferred by Humble Oil & Refining Co. from district production superintendent in Winters, Tex., to the Galveston district, where he'll head offshore drilling operations. **C. S. Yust,** former assistant to McFadden, will replace him in Winters. **C. W. (Bill) Armstrong** moves from assistant petroleum engineer in the Wichita Falls district to succeed Yust.

V. L. (Fred) Smith, district superintendent in Sunray Mid-Continent Oil Co.'s production department, has been shifted from the Oklahoma district in Oklahoma City to the North and West Texas district in Midland. **J. F. (Duke) Dingee,** former assistant superintendent for the Kansas district, replaces Smith. Other Sunray production changes: **L. A. Prichett,** former western area field superintendent in the Oklahoma district, becomes Osage area superintendent in Pawhuska, Okla.; **E. F. Patrick,** formerly at Midland, succeeds Prichett; **R. R. Rothrock,** who was Osage area superintendent, goes to Oklahoma City as assistant to Dingee; **Grant E. McClatchey,** former assistant superintendent in the South Texas district, transfers to Midland as development superintendent of that district; and **A. E. (Gene) Meissner,** former field superintendent in Placedo, Tex., replaces McClatchey.

Personals

David J. Kull has returned from a special foreign assignment for Shell Oil Co. to become Kansas division exploration manager. He succeeds **Alfred N. Sharrick,** who has been transferred to Midland, Tex. Kull joined Shell in 1948 as junior geologist. He was exploration manager of the Colorado division from 1954-55.

George J. Peterschmidt has been elected president of El Dorado Refining Co., El Dorado, Kans. He replaces **T. A. Helling,** elevated to board chairman.

C. B. Lester has resigned as engineer with Mid-Valley Pipe Line Co., Longview, Tex., to join Bechtel International, Inc., San Francisco.

Sir Frederick Godber, chairman of Shell Transport & Trading Co., and with the Shell group and predecessors since 1904, has been named Baron Godber, of Mayfield, County of Sussex.

John J. Rupnik and **Albert L. Ballou, Jr.,** have resigned as partners in the geophysical firm of Manhart, Millison & Beebe, Tulsa, to form their own partnership there.

S. W. Totten, superintendent of western division exploration for The California Co., has been advanced to vice president and general manager of exploration in the western region, Denver. The region is made up of California's western and northwestern exploration divisions.

William T. Pyott, since 1952 a director of Pipe Line Technologists, Inc., has been named executive vice president of the Houston firm. **Don H. Lewis,** retired vice president of Shell Pipe Line Corp., has been elected a director and vice president. Pyott has been an authority on pipeline engineering 20 years. Lewis is a former chief engineer for Shell Pipe Line. Pipe Line Technologists engineers finances and operates pipelines.

W. T. PYOTT

D. H. LEWIS

Rocky Mountain A.A.P.G. Elects Neighbor

Frank Neighbor, with Sun Oil Co. in Salt Lake City, has been elected president of the Rocky Mountain section, American Association of Petroleum Geologists. The new officers are, left to right: Darwin Quigley, Price Exploration Co., Salt Lake City, state representative for Utah; Neighbor; Otto E. Brown, Gulf Oil Corp., Durango, Colo., state representative for New Mexico; and N. W. Don Quigley, Salt Lake City consultant, secretary-treasurer. Not pictured is Dave Moore, Hancock Oil Co., Casper, Wyo., vice president.

T. B. Houck, drilling superintendent in West Texas and New Mexico for Parker Drilling Co., Midland, Tex., has left for Tel Aviv, Israel, to be acting general manager of Pantepec Oil Co.'s operations there. Parker Drilling will manage Israeli drilling and production for Pantepec. Two Pantepec subsidiaries, Pan-Israel, Ltd., and Israel Mediterranean, Ltd., operate three rigs in the country.

Gerald N. Smith has been named exploration manager of McRae Oil & Gas Corp. at Midland, Tex., and **G. D. Simon** has joined the firm as production manager. Smith has 25 years' experience in the Mid-Continent, Gulf Coast, and Rocky Mountain areas, and Canada. Simon has been with The Texas Co. and R. DeChicchis, independent.

W. H. (Henry) Conkling, who resigned recently as chief geologist of Plymouth Oil Co. at Sinton, Tex., to become a consultant in Abilene, Tex., has been retained by Sequoia Oil Co. and its affiliate, Texas Crude Oil Co.

Alonzo R. Castoe, Pure Oil Co. gas engineer, has been transferred from Houston to Fort Worth. Other Pure changes: **Ernest S. Dietrich,** staff geologist, from Abilene, Tex., to Fort Worth; **Raymond W. Hall,** staff geologist, from Fort Worth to Midland, Tex.; and **Charles H. Clark,** senior production engineer, from Pure's Crystal Lake laboratory to Fort Worth.

J. P. Badami has been promoted by Continental Oil Co. from geophysicist in Denver to geophysical supervisor in Durango, Colo., a newly created post. Badami joined Conoco in 1948. **Francis W. McWilliams,** Denver, has been named assistant division land superintendent with headquarters at Casper, Wyo.

Chester E. Weger, vice president and director of Cities Service Refining Corp., has been elected a director of the parent Cities Service Co., New York.

Vernon Blain, Odessa, Tex., former executive vice president and drilling superintendent of Johnn Drilling Co., Fort Worth, has been elected president. He replaces **Johney Cockburn,** recently resigned. **John St. John,** former vice president, succeeds Blain.

David F. Donnell has been promoted by Lone Star Gas Co. from assistant superintendent at the Jacksboro, Tex., compressor station to superintendent of the firm's new station at Temple, Tex. **James H. Berry** replaces Donnell.

Otto N. Miller, former manufacturing manager and now a vice president of Standard Oil Co. of California, has been named chairman of Western Oil and Gas Association's air pollution control committee. He succeeds **P. S. Magruder,** executive vice president of General Petroleum Corp. The appointment is for a 2-year term.

William A. Gaither has resigned as special sales engineer with Black, Sivals & Bryson, Oklahoma City, to join Sunray Mid-Continent Oil Co. as senior production engineer in the gas-gasoline division, Tulsa.

S. V. McCOLLUM

S. V. McCollum, now assistant production manager of Continental Oil Co.'s southwestern region, has been promoted to production manager for the newly formed C. A. T. C. marine region. The new region, headquartered in Houston, will be operator for the C.A.T.C. Offshore Group, composed of Conoco, Atlantic Refining Co., Tide Water Associated Oil Co., and Cities Service Oil Co. Until now Conoco has been operator for C.A.T.C. through its offshore marine department. McCollum's new staff will include: **John H. Davis,** former offshore division exploration manager, who'll hold the same post with the new region; **W. A. Pearce,** former section chief in the headquarters production department, who becomes C.A.T.C. regional engineer; **H. A. McKinley,** promoted from offshore division land superintendent to regional land superintendent; **R. M. Dungan,** former Houston offshore division geologist, who'll be regional geologist; **D. F. Wint,** promoted from offshore division geophysicist to C.A.T.C. regional geophysicist; and **M. J. Lindsay,** promoted from offshore division chief clerk to the same post in the new region.

Robert S. Kestner, with Sohio Pipe Line Co. since 1947, has been named group engineer in the construction section of the manufacturing department, Standard Oil Co. (Ohio).

Bruce Foster has been transferred by M. W. Kellogg Co. from pipe superintendent in Lima, Ohio, to area superintendent in Yorktown, Va.

William Lloyd Skaggs has resigned as senior chemical engineer for Gulf Oil Corp. in Port Arthur to join Lummus Co. as process engineer in Houston.

Maurice L. Brown, Kansas City, and **Earl M. Burch,** Wichita, have formed Colorado-Century Co. for exploration and production in the Denver Julesburg basin. **Elliott Bratt,** former district geologist for Cooperative Refinery Association, will be manager for the Denver-based partnership.

R. S. Conly has been named assistant general foreman of the light-ends department in Humble Oil & Refining Co.'s Baytown, Tex., refinery. Other promotions at the Baytown plant: **C. A. Hansen, Jr.,** to assistant general foreman; **J. W. Ferrell,** to foreman of cracking and polymerization; and **C. H. Marshall,** to solvents section head in the technical service division.

Jack Barcklow, Jr., formerly with British-American Oil Producing Co. in Oklahoma City, has joined Tennessee Gas Transmission Co. as geologist there.

Douglas R. Kennan, Jr., has resigned as senior geologist for Sinclair Oil & Gas Co.'s Gulf Coast division to join the staff of Gulf Coast Leaseholds, Inc., Houston.

Charles M. Heard has been promoted by Anderson-Prichard Oil Corp. from district foreman in Oklahoma City to district engineer in Denver.

W. T. Wheeler, Jr., has been promoted by Continental Oil Co. from trainee in Fort Worth to associate engineer in Eunice, N. M.

L. Z. Mallory, Jr., has been transferred by Arkansas Louisiana Gas Co. from assistant measurement engineer in Waskom, Tex., to plant engineer at the Magnolia, Ark., gasoline plant.

George A. Wilkinson, Vancouver, has been reelected president of the Pipe Line Contractors Association of Canada. Reelected directors were **R. K. Bannister,** Edmonton; **E. W. Costello,** Calgary, and **C. A. Callahan,** Oakville, Ont. **George Murray,** Calgary, was named a new director.

Leonard K. Buller, since 1951 a party chief with Southern Geophysical Co., has been named field supervisor for the firm in Houston.

R. K. (Bob) Franklin, Houston, president and founder of Rollo Manufacturing Co., has been named chairman of the Nomads' national board of regents. Franklin succeeds **James D. Hughes,** of Lane Wells Co., Los Angeles. **W. L. (Bill) Childs, Jr.,** Reed Roller Bit Co., Houston, was elected secretary-treasurer.

Frank N. Lammerman, former superintendent of plants in Union Oil Co. of California's Cut Bank, Mont., refinery, has been named superintendent of gasoline treating in the Oleum refinery near Rodeo, Calif. **John A. Cristiansen,** former assistant to Lammerman, succeeds him at Cut Bank.

Personals

R. J. Adams has been promoted by Phillips Petroleum Co. from southwest regional geologist in Bartlesville, Okla., to division manager in Corpus Christi. **J. H. McLaren,** former division landman there, has been named assistant division manager. Adams joined Phillips in 1936 as a seismograph computer in Nocona, Tex. After serving a time as party chief, he went to Wichita Falls as senior geologist. He later became assistant district geologist and district geologist there before assuming the Bartlesville post.

Vincent J. Sikora, former reservoir engineer for Atlantic Refining Co. in Houston, has joined Data Processing Co. as a petroleum engineer in San Antonio.

DEATHS

H. A. Coffin, 78, for many years manager of Socony Mobil Oil Co., Inc.'s Michigan-Ohio division, died February 28 in Washington. Coffin, who also once managed Socony's Trenton, Mich., refinery, retired in 1946 when he was elected United States Congressman from the Detroit district. He served one term. Coffin had served as international director of the Y.M.C.A. and was a national founder of the Community Chest plan. He was a former director of Western Petroleum Refiners Association.

Wayne Jennings Blankenship, 55, of Camdrill International, Inc., died recently in Beaumont. Blankenship, an associate of Neil Ammons in Bakersfield, Calif., drilling during the late 1930's and 1940's, had been with Camdrill about 2 years. He had just returned from the firm's Egyptian operations.

Lloyd E. Sandell, 53, co-owner of Berridge & Sandell, drilling contractors, died recently in Conrad, Mont.

W. E. Gentry, 60, station foreman for Humble Pipe Line Co., died recently in Houston.

W. A. (Bill) Drake, 58, superintendent of Humble Oil & Refining Co.'s Tomball, Tex., gasoline plant, died February 28 in Tomball. He had worked for Humble 36 years.

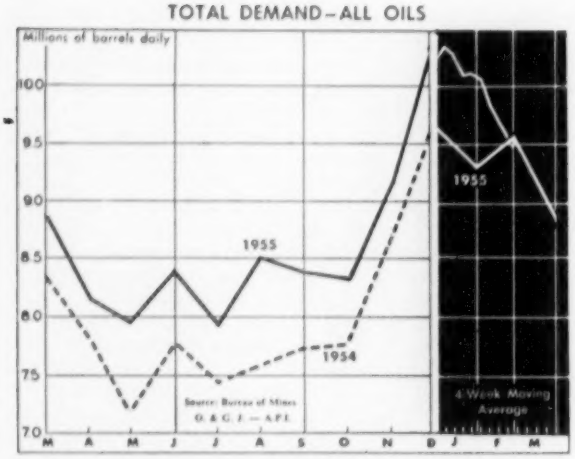
Nelson N. Clabaugh, owner of Clabaugh Drilling Co. and partner in C-B Drilling Co. in Oklahoma City, died there February 26. He was 45.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,196,160	UP	69,350	UP	331,061
Crude stocks	256,645,000	UP	3,161,000	DOWN	2,408,000
Completions	981	DOWN	47	DOWN	65
Refinery runs	8,084,000	UP	95,000	UP	411,000
Gasoline stocks	193,988,000	UP	4,560,000	UP	12,678,000
Kerosine stocks	18,684,000	DOWN	857,000	DOWN	107,000
Distillate stocks	74,330,000	DOWN	3,520,000	UP	5,599,000
Residual stocks	37,102,000	DOWN	1,101,000	DOWN	8,550,000
Four-product stocks	324,104,000	DOWN	918,000	UP	9,620,000
Total imports	1,382,100	DOWN	48,500	DOWN	125,200

TOTAL DEMAND—ALL OILS



March and April Will Be Critical Months for Most Product Markets

WEATHER and refinery runs will be the major factors in March. Lower temperatures in the northeastern states and in the high demand areas near the Great Lakes would tend to keep distillate markets on an even keel for a few more weeks. However, as much as 2 weeks of winterlike weather in March would tend to add to the pressure on gasoline prices.

Cooler weather in the Upper East Coast for the week ended February 25 added more to sales by distributor to consumer than to shipments from primary to secondary suppliers. On the Gulf Coast No. 2 fuel is available at posted prices with unconfirmed reports that the price could be shaded for March liftings.

Refiner attention in the Mid-Continent has turned from heating oils to gasoline. Since most of the Mid-Continent suppliers are planning reductions in kerosine and distillate stocks at terminals along the Great Lakes Pipe Line, a period of very cold weather in March could find some areas a little short on light heating oils unless the difference is made up by tank-car shipments from Mid-Continent refiners.

Residual fuels are more readily available in the Group 3 area. Customers are no longer offering over-the-low prices for high-sulfur material. However, high demands for asphalt during the summer months will help prevent excess offerings this spring and summer. Additions to coking capacity in the past year tend to give further assurance of reasonably good residual markets this summer.

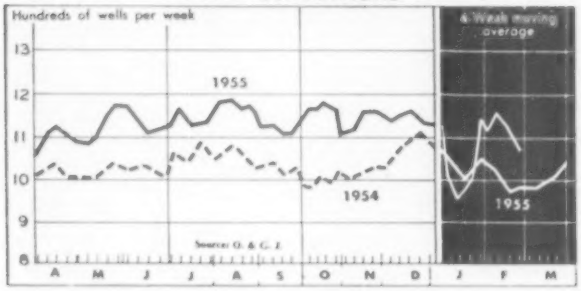
Some high-sulfur residual is reported to be available on the Gulf Coast at the low of the market. For all areas east of California, stocks of residual fuel are 5,800,000 bbl. above last year. But, shipments to the East Coast and Atlantic exports in 1955 reduced California stocks to such a low level that imports may be necessary in order to meet domestic and military demands. Standard Oil Co. of California raised residual prices 5.0 cents a barrel effective February 28.

Gasoline prices move in all directions . . . It is about the time of year for gasoline markets to become very sensitive to demand factors. Some regular gasoline is available on the Gulf Coast with part of it reported to be hunting a market. Part of this may move at a price that will be under the low of the market. There were rumors of an increase in Group 3 spot prices just before the end of February, but the raise failed to materialize. Prices for premium will go up 0.5 cent a gallon on the Group 3 market as soon as quality is raised two octane numbers in April. Standard of California raised gasoline prices 0.2 cent a gallon on the West Coast. Service-station price wars continue in the northeastern states.

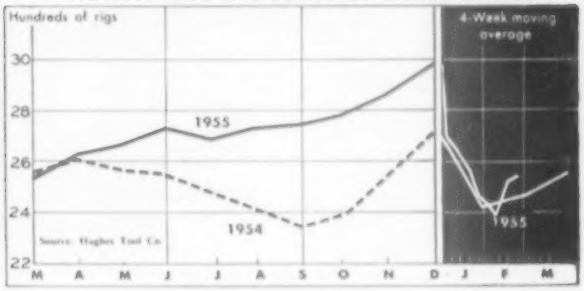
The solution to the problem depends on the refiner himself. If he is willing to tailor refinery operations to fit demand over the next 2 months, prices will be strong enough to prevent losses from refining.

Refinery runs averaged 8,084,000 bbl. daily for week ended February 25 for a gain of 95,000 bbl. daily over the previous week. Gasoline stocks climbed to almost 194,000,000 bbl. or only about 2,000,000 bbl. below the critical level estimated for the end of March.

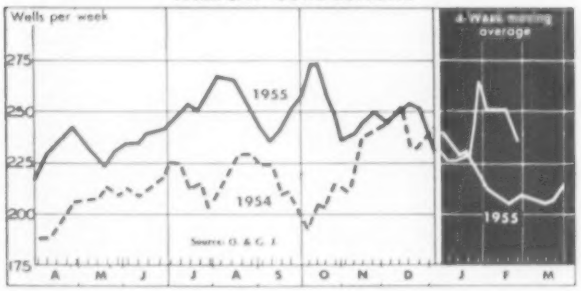
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	2-27-56	Change from 2-20-56	Change from 2-28-55
Gulf Coast	644	—1	101
N. and W. Texas-New Mexico	903	29	97
Arkansas-N. Louisiana-E. Texas	148	—5	— 6
Oklahoma	313	8	27
Kansas-S. Nebraska	173	—3	—11
Illinois-Eastern	76	6	—30
Rocky Mountain	185	—3	—10
Pacific Coast	131	8	—19
Total United States	2,573	39	149
Western Canada	226	—5	28

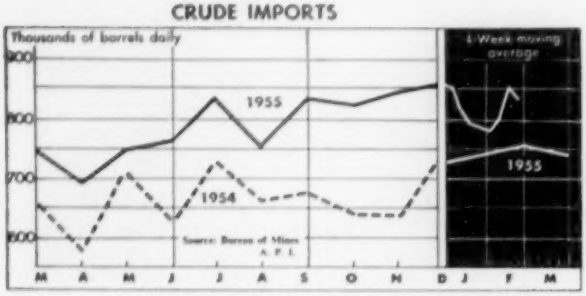
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED FEBRUARY 25, 1956

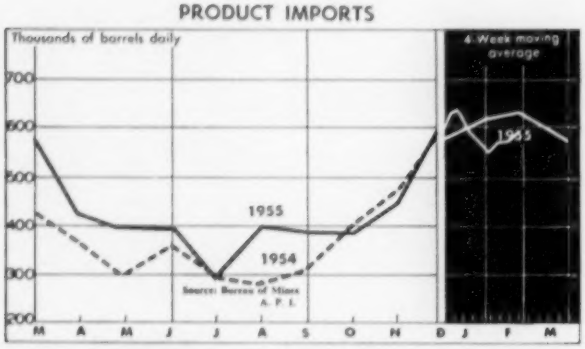
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1956	Cum. 1955	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1956: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	1	0	0	1	4,287	17	20	0	0	0	1	1	0	0	0	10	10
Arkansas	7	4	0	3	21,470	103	78	0	0	0	2	2	5	0	1	17	23
California	26	19	1	6	123,862	292	307	0	0	0	6	6	7	0	0	48	55
Colorado	15	7	1	7	80,710	176	187	0	0	0	5	5	2	0	3	82	87
Illinois	72	31	0	41	172,917	618	605	2	0	0	15	17	9	0	0	86	95
Indiana	5	2	0	3	8,940	102	107	0	0	0	2	2	3	0	1	24	28
Kansas	89	40	3	*46	299,121	729	763	0	0	0	10	10	12	1	6	132	151
Kentucky	34	16	3	15	45,284	291	200	1	0	0	6	7	8	0	0	68	76
Louisiana	74	51	9	14	615,459	645	600	8	0	2	6	16	18	12	5	82	117
North	24	17	4	3	97,319	248	314	2	0	0	2	4	5	0	0	27	32
South	34	23	3	8	373,720	317	286	5	0	2	3	10	12	11	3	50	76
Offshore	16	11	2	3	144,420	80		1	0	0	1	2	1	1	2	5	9
Michigan	9	4	0	5	30,154	81	96	1	0	0	3	4	3	0	0	24	27
Mississippi	6	4	0	2	47,244	70	65	0	0	0	2	2	4	0	0	28	32
Montana	6	3	0	3	38,045	64	59	0	0	0	2	2	3	0	0	17	20
Nebraska	14	5	0	9	76,555	135	84	0	0	0	6	6	6	0	0	63	69
New Mexico	20	11	8	1	101,853	302	163	0	0	1	1	2	7	0	5	29	41
Northwest	9	0	8	1	35,913	105	42	0	0	1	1	2	0	0	5	9	14
Southeast	11	11	0	0	65,940	197	121	0	0	0	0	0	7	0	0	20	27
North Dakota	6	3	0	3	52,478	34	27	0	0	0	0	0	2	0	0	6	8
Ohio	16	7	3	6	44,600	165	159	1	0	0	0	1	1	0	0	2	3
Oklahoma	139	92	4	†43	502,007	1,375	1,186	4	0	2	9	15	26	5	4	125	160
Pennsylvania-New York	27	11	1	15	38,287	106	275	0	0	0	0	0	0	0	1	2	3
Texas	384	237	14	133	1,706,588	3,272	2,887	14	1	3	76	94	144	10	30	732	916
Southwest (1 & 4)	54	26	2	26	214,717	468	459	2	0	2	18	22	26	2	9	150	187
Gulf Coast (2 & 3)	39	20	5	14	280,943	421	402	1	1	0	10	12	10	7	11	111	139
East (5 & 6)	31	14	2	15	150,632	202	176	0	0	1	10	11	1	1	2	80	84
North Central (7-B & 9)	132	70	2	60	468,081	1,123	938	6	0	0	24	30	70	0	1	257	328
West (7-C & 8)	115	96	2	17	547,127	879	742	5	0	0	13	18	33	0	5	124	162
Panhandle (10)	13	11	1	1	45,088	179	170	0	0	0	1	1	4	0	2	10	16
Utah	2	1	0	1	10,023	13	8	1	0	0	1	2	1	0	0	10	11
West Virginia	14	0	11	3	41,778	105	101	0	0	0	0	0	0	0	0	1	1
Wyoming	14	11	0	3	80,638	125	151	0	0	0	3	3	2	0	4	40	46
Miscellaneous (S. D.)	1	0	0	1	9,365	30	5	0	0	0	1	1	4	0	0	18	22
Total United States	**981**	559	58	364	4,151,665	8,850	8,133	32	1	8	157	**198**	267	28	60	1,646	2,001
Total previous week	1,028	557	54	417	4,225,869			31	2	5	204	242	235	27	52	1,489	1,803
Total February 26, 1955	1,046	564	58	424	4,193,738			29	4	8	186	227	234	27	48	1,414	1,723
Cumulative 1956	8,850	4,808	579	3,463	36,402,715												
Western Canada	33	21	1	11	217,238	345											

Service wells included: *2, †13.

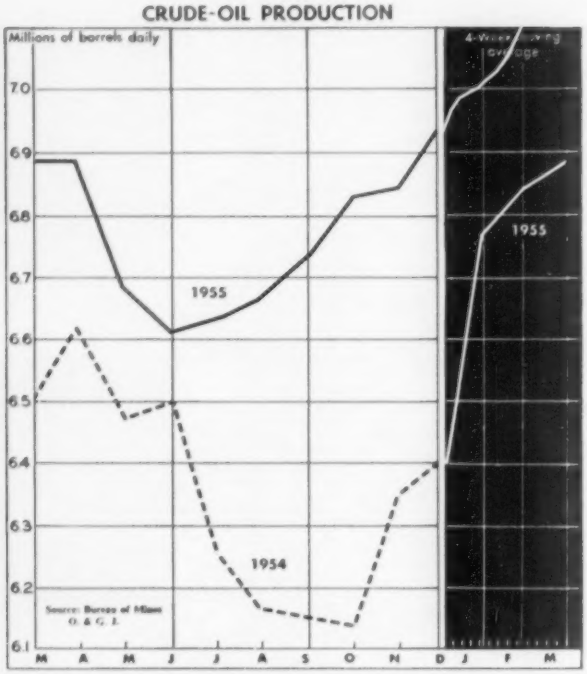
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

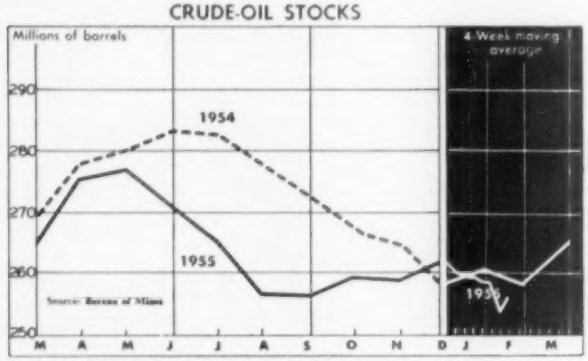


DAILY AVERAGE PRODUCTION FOR WEEK

	February 25			Feb. 18
	Crude oil	Lease condensate	Total	total
Alabama	4,300		4,300	4,200
Arkansas	73,900	500	74,400	73,300
California	974,500		974,500	973,300
Colorado	161,900		161,900	159,100
Eastern	48,500		48,500	49,000
Florida	1,350		1,350	1,350
Illinois	233,600		233,600	225,400
Indiana	31,500		31,500	31,300
Kansas	347,500		347,500	343,300
Kentucky	45,900		45,900	45,200
Louisiana	739,550	67,100	806,650	804,000
North	119,550	2,100	121,650	119,000
South	620,000	65,000	685,000	685,000
Michigan	30,100		30,100	30,900
Mississippi	106,500	4,975	111,475	111,475
Montana	49,100		49,100	44,200
Nebraska	29,200		29,200	29,700
New Mexico	235,900	4,375	240,275	240,475
North Dakota	35,900		35,900	42,200
Oklahoma	645,700		645,700	591,200
Texas	2,978,300	54,100	3,032,400	3,032,400
Dist. 1	53,000	600	53,600	53,600
Dist. 2	151,000	8,375	159,375	159,375
Dist. 3	441,000	25,300	466,300	466,300
Dist. 4	246,000	5,350	251,350	251,350
Dist. 5	46,500	525	47,025	47,025
Dist. 6	130,000	6,275	136,275	136,275
East Texas Field	223,800		223,800	223,800
Dist. 7-B	156,000	50	156,050	156,050
Dist. 7-C	179,000	4,800	183,800	183,800
Dist. 8	1,050,000	2,000	1,052,000	1,052,000
Dist. 9	209,000	600	209,600	209,600
Dist. 10	93,000	225	93,225	93,225
Utah	7,000		7,000	6,300
Wyoming	284,700		284,700	288,100
Others	‡200	§10	210	410
Total U. S.	7,065,100	131,060	**7,196,160**	7,126,810
Change from previous week, up			**69,350**	
Canada	†477,700		†477,700	481,600
Total U. S. production January 1-February 25			395,204,180 bbl.	
Same period last year (crude plus cond.)			*380,289,604 bbl.	

*Includes 6,339,750 bbl. condensate. †Week ended previous Monday. ‡Nevada. §Arizona.

CRUDE-OIL STOCKS



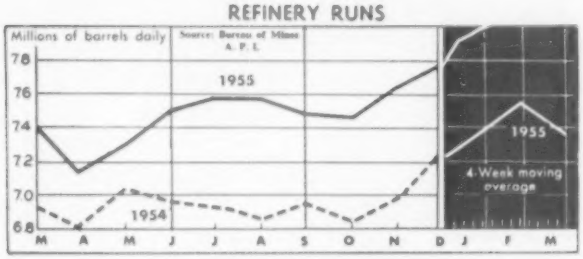
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of Barrels)

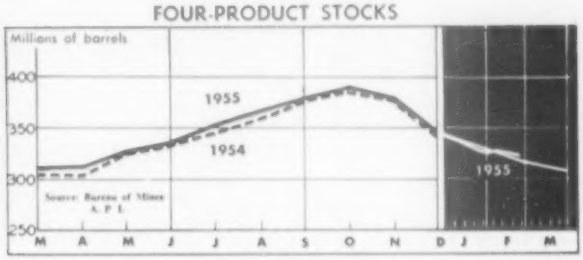
	2-18-56	2-11-56	2-19-55
Pennsylvania Grade	2,713	2,651	2,975
Other Appalachian	1,816	1,942	1,715
Illinois, Indiana, Michigan	9,259	9,358	11,338
Nebraska, North Dakota	2,193	2,017	1,792
Kansas	8,094	7,718	8,737
Oklahoma	22,647	21,582	23,576
Arkansas	2,145	2,209	3,108
Louisiana	16,431	15,960	14,404
North	2,581	2,623	2,321
South	13,850	13,337	12,083
Mississippi	2,967	2,943	3,409
New Mexico	7,804	7,269	8,356
Texas	120,696	121,521	118,187
East Texas proper	8,785	8,981	10,222
West	58,988	59,676	51,491
Texas Gulf	22,534	22,437	23,267
Other Texas	30,389	30,427	33,207
Wyoming	15,235	15,231	14,054
Other Rocky Mountain	5,208	5,179	5,174
California	28,209	27,531	32,125
Foreign	†11,228	10,373	10,103
Total	256,645	253,484	259,053

*Bureau of Mines. †Includes 1,231,000 bbl. in California.

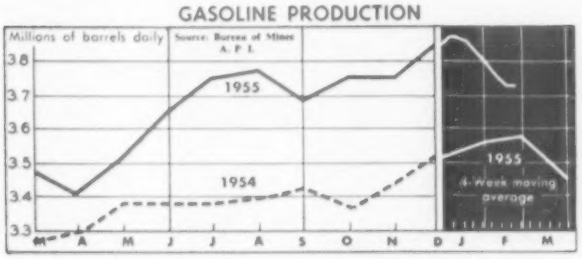
REFINERY RUNS



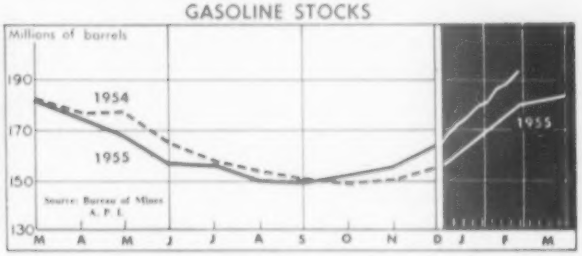
FOUR-PRODUCT STOCKS



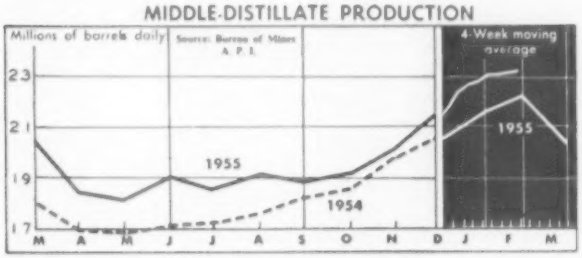
GASOLINE PRODUCTION



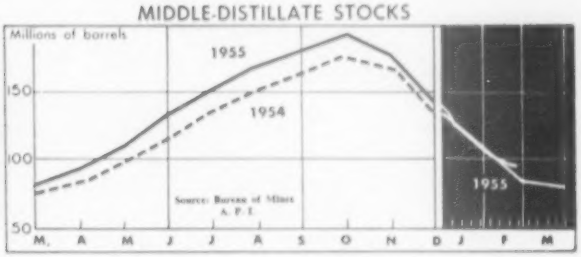
GASOLINE STOCKS



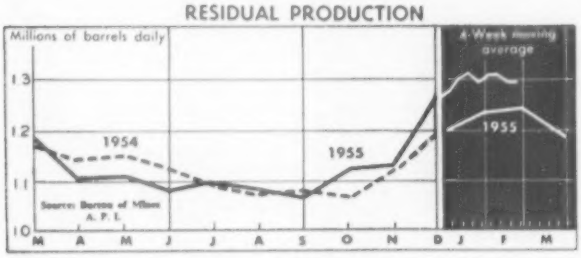
MIDDLE-DISTILLATE PRODUCTION



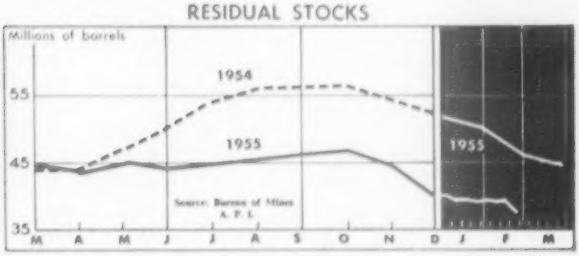
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, FEBRUARY 24

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, February 1955 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,118	447.4	43.7	336.0	251.0	37,538	8,877	28,243	11,079	1,102	437.2	40.4	306.4	244.5
Appalachian:														
District 1	103	41.3	4.0	25.9	10.1	4,824	509	1,611	390	98	41.2	5.2	25.2	9.1
District 2	110	51.9	6.7	23.0	12.4	3,149	294	538	268	91	47.7	6.6	19.3	15.1
Ind., Ill., Ky.	1,410	687.4	61.7	304.7	193.7	40,151	3,856	12,457	3,621	1,394	707.5	80.1	312.6	190.2
Okla., Kans., Mo.	776	433.9	20.7	211.4	34.4	22,430	816	7,702	893	670	380.0	19.0	171.5	45.4
Inland Texas	277	191.4	15.3	45.9	25.9	7,753	302	1,206	1,290	258	182.6	11.4	52.6	18.2
Texas Gulf Coast	2,026	898.9	126.5	587.3	268.9	29,100	1,917	6,328	6,279	1,894	843.4	130.6	525.8	243.5
La. Gulf Coast	684	327.7	56.0	206.3	43.4	10,479	1,088	3,510	1,592	645	305.3	60.5	165.7	39.8
N. La. and Ark.	93	37.1	10.0	21.6	6.7	5,084	494	1,290	78	94	33.9	10.7	21.9	6.7
Rocky Mountain:														
New Mexico	20	10.0		3.7	2.7	313	6	54	30	20	11.4	0.5	3.0	2.7
Other Rocky Mtn.	289	133.3	6.4	65.7	43.6	7,901	244	2,262	733	256	119.9	4.6	62.9	40.0
California	1,178	509.6	14.0	144.1	368.3	25,266	281	9,129	10,849	1,027	456.9	4.4	180.2	383.5
Feb. 24, 1956	8,084	3,769.9	365.0	1,975.6	1,261.1	193,988	18,684	74,330	37,102	7,549	3,567.0	374.0	1,847.1	1,238.7
Feb. 17, 1956	7,989	3,699.9	389.0	1,961.4	1,279.0	189,428	19,541	77,850	38,203					
Feb. 25, 1955	7,673	3,621.3	364.3	1,183.4	1,272.7	181,310	18,791	68,731	45,652					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-oil and refinery prices at representative U. S. and foreign points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (86 octane)	11.00-11.25
Premium (94 octane)	12.50-12.75
Gulf Coast (Cargoes for coastwise or export movement):	
Regular (90 octane)	11.00-11.25
Premium (97 octane)	13.00-13.25
New York (barges):	
Regular (89 octane)	12.25
Premium (96 octane)	14.50
California—Los Angeles (rack):	
★ Regular (84 octane)	12.75-13.15
Premium (93 octane)	14.10-15.10
Caribbean area (cargoes):	
Regular (87 octane)	10.50
Premium (93 octane)	11.50

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	5.0
Breckenridge:	
Grade 26-70	4.5

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16-lb. Prices for grades below 16-lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	10.25-10.375
Diesel oil (58 d.i. and above)	9.875-10.00
Distillate No. 1	9.875-10.00
Distillate No. 2	9.25-9.375
Gulf Coast (cargoes):	
Kerosine 41-43	9.5-9.625
Distillate No. 2	9.00-9.25
New York Harbor (barges):	
Kerosine 41-43	10.85
Distillate No. 2	10.35
Diesel fuel, 48-52 d.i.	10.65
Caribbean area (cargoes):	
Distillate No. 2	9.00

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude scale (solid in bags or barrels)	7.10

★ Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$2.10-2.20
Gulf Coast (cargoes):	
Bunker C fuel	$2.10
New York Harbor (barges):	
Bunker C fuel	$2.65
Caribbean (cargoes):	
Bunker C at Aruba, N.W.I.	$2.10
California (rack):	
★ Bunker C fuel, Los Angeles	$2.10-2.20

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined 0-10 p.p., 95 v.i.	23
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	19.75
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	23.5
200 vis. neutral (180 at 100°), 25 p.t.	20

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$2.02				
15-15.9	2.08				
16.16.9	2.13				
17-17.9	2.19				
18-18.9	2.24				
19-19.9	2.30				
20-20.9	2.35	$2.50		$2.37	
21-21.9	2.41	2.52		2.39	
22-22.9	2.47	2.54		2.41	
23-23.9	2.52	2.56		2.43	
24-24.9	2.58	2.58	$2.91	2.45	
25-25.9	2.64	2.60	2.93	2.47	
26-26.9	2.69	2.62	2.95	2.49	
27-27.9	2.76	2.64	2.97	2.51	
28-28.9	2.83	2.66	2.99	2.53	
29-29.9	2.91	2.68	3.01	2.55	
30-30.9	2.97	2.70	3.03	2.57	
31-31.9	3.04	2.72	3.05	2.59	$2.46
32-32.9	3.12	2.74	3.07	2.61	2.48
33-33.9	3.20	2.76	3.09	2.63	2.50
34-34.9	3.27	2.78	3.11	2.65	2.52
35-35.9	3.34	2.80	3.13	2.67	2.54
36-36.9	3.39	2.82	3.15	2.69	2.56
37-37.9		2.84	3.17	2.71	2.58
38-38.9		2.86	3.19	2.73	2.60
39-39.9		2.88	3.21	2.75	2.62
40 and up		2.90	3.23	2.77	2.64

*Includes Oklahoma, Kansas, North Dakota, West Texas (sweet), North Central Texas, North Louisiana, Arkansas, and Wyoming (sweet). †Low-cold-test Gulf Coast. ‡Sour.

Effective dates: California, February 7, 1956; east of California, June 15, 1953; Pennsylvania Grade, February 6, 1956.

FLAT PRICES

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.00
Middle District	3.87
Southwest Pennsylvania	3.58
West Virginia	3.46
Buckeye Grade	3.40
Zanesville Grade	2.97
Illinois Basin	3.00
Canada:	
Leduc-Woodbend (flat prices D-2, D-3)	2.60
Redwater (Alta.) D-3	2.49
Smiley-Viking (Sask.)	2.26
Fosterton (Sask.)	1.29
Pembina	2.52

FOREIGN

Venezuela:	
Cumarebo, 48°-48.9°, Tucupido	*$3.40
San Joaquin, 41°-41.9°, Puerto La Cruz	*3.04
Oficina, 35°-35.9°, Puerto La Cruz	*2.80
Tia Juana medium, 26.5°-26.9°, Amuay	†2.30
Quiriquire, 16.5°-16.9°, Caripito	‡2.21
Lagunillas heavy, flat, Amuay or Las Piedras§	2.05
Bachaquero, 16.5°-16.9°, Amuay or Las Piedras§	‡1.90

*Plus or minus 2 cents per barrel for each degree gravity change. †Plus or minus 2.5 cents per barrel for each half-degree gravity change. ‡Plus or minus 3.5 cents per barrel for each half-degree gravity change. §Also available at La Salina at 3.0 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$1.97
Iranian, 34.0°-34.9°, Bandar Mashur	1.91
Iranian, 34.0°-34.9°, Abadan	1.86
Iraq, 36.0°-36.9°, Fao	1.87
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.72
Qatar, 39.0°-39.9°, Umm Said	2.06
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.46
Iraq, 36.0°-36.9°, Tripoli, Banias	2.46
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°-38°	2.60

TANKER RATES (PER LONG TON)
(Latest reported spot fixtures)

Gulf-U.S.N.H., clean (USMC flat)	$2.85
★Gulf-U.S.N.H., dirty (USMC —20%)	2.28
★NWI-U.S.N.H., dirty (USMC —10%)	2.43
★Persian Gulf-U.S.N.H., dirty (USMC —15%)	10.80
★Persian Gulf-U.K., dirty (Scale + 35%), (64s. 7d.)	9.07

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FOR SALE—2 truck mounted Bettis steam units. Good condition, equipped for oil field work. Box J-332, The Oil and Gas Journal, Tulsa, Oklahoma.

U-15 DRILLING RIG located in Ochiltree County, Texas. Will take supply house credit. Box J-316, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—Near Madison, Kansas: 4 miles 2" beveled range 1, 2" grade used line pipe, 25 cents per ft., clean inside and out. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

3500' ROTARY Wilson Super draw-works. 145 H.P. Waukesha engine, 87' pole mast stands double 7¼ x 10 mud pump powered with Waukesha, 3000' of 3½" drill pipe, complete every way. New in 1954. Sacrifice $27,000.00. Call Hughes, RIverside 2-8147 Nights, Tulsa.

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Duplex from 4x3x4 to 10x7x12

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4-6% Chrome ½ New Cost

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2'x47' 375 PSI 20 trays.
3'x49' 425 PSI 28 trays.
7'x54' 150 PSI 20 trays.
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FOR SALE—At our Oklahoma City warehouse one used 2½"-5" x 10" Gaso power pump, Fig. 710-S Serial No. 7435 on steel base and V-belted to HXE Hercules motor, serial No. 3330493. Price $1250.00. Cities Service Pipe Line Company, Patridge, Bartlesville, Oklahoma.

NEW 3500' DRAWWORKS. Complete with motors, two drums & Spudding attachment (never used) $3850.00. One Gumbo Buster Rotary table, 17½" $750.00. 2000' used 3½" drill pipe @ $1.00 per foot. One Brewster Swivel $500.00. P. O. Box 346, Sullivan, Indiana.

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One (1) new fractionating tower, 5'0" I.D. x 89'6" overall height by 1⅛" plate. Thirty-four (34) bubble trays, ten (10) 18"-300# manways. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure. Located Wichita, Kansas.

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NEW STEEL PIPE

Outside Diameter	Weight	Footage
4½"	7.25#	12,500
6⅝"	17.02#	7,500
8⅝"	19.64#	13,500
8⅝"	23.57#	11,500
10¾"	28.04#	2,800
10¾"	31.20#	4,000
20"	65.71#	600
22"	65.24#	750
24"	71.25#	850
30"	109.60#	900

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SMALL LIQUID Extraction and gasoline plant for sale or lease. Box J-389, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: Wilson-Snyder mud pump, 7¼" x 18". Top condition and less than half price. L. T. Peyton Machine Shop, Vernal, Utah. Phone 267.

1200 FT.—20" O.D. ⅜" wall, good used Gas Line Pipe, 20 ft. random lengths, straight and beveled. Priced reasonably F.O.B. cars Western Pennsylvania point. Box J-408, The Oil and Gas Journal, Tulsa, Oklahoma.

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FOR SALE—At our Oklahoma City warehouse one used 2½"-9" x 10' Fig. 1450 Wheatley power pump, Ser. WBM 2060, mounted on steel base and DC to Buda BTH motor, Ser. No. 226569A with extra set of 3" and 3½" liners. Price $1250.00. Cities Service Pipe Line Company, Patridge, Bartlesville, Oklahoma.

Service Company

HAVE BEST well servicing outfit in Osage. All new equipment. 2 Spudders and 4 double drum Franks units. Will net $5,000.00 per month. Have own yard and office. $135,000 cash for quick sale.

Box J-378, The Oil and Gas Journal, Tulsa, Oklahoma.

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PURE OIL COMPANY REFINERY
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3,000 bbl. Thermal Cracking Unit
6,000 bbl. Topping Plant
Complete Rerun Unit
Two POLY PLANTS
Lube Oil & Paraffin Wax Plant
Six B&W H.R.T. Boilers, 250 H.P.
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Over 100 HEAT EXCHANGERS from 80 to 1,500 sq. ft.
COOLERS and CONDENSERS all sizes to 850 sq. ft.
HOT OIL CHARGE PUMPS steam and gas engine driven.
Storage Tanks, suitable for Bulk Plants
LARGE TANK FARM, riveted tanks from 1,000 to 55,000 bbl. capacity
Complete ETHYL Blending Unit, 8500 gal. cap.
LABORATORY—INSTRUMENTS—
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PUMPS . . . over 200 for every type service, electric motor, gear and steam driven.

Many other items too numerous to list. . . . Substantial Savings.
Write For Detailed Catalogue

Brown-Strauss Corporation

1546 Guinotte Ave. Kansas City, Mo.
Phone HArrison 1-1000

FIELD OFFICE:
Cabin Creek (suburb of Charleston), W. Va.
Phone: East Bank 5811.
Mail Address P. O. Box 2921
Charleston, W. Virginia
ROY CRISP, Mgr.

FOR SALE EQUIPMENT

MAYHEW "HURRICANE" Rotary Air Drill on F-8 Ford truck, two years old, excellent condition. Taylor Lime & Stone Co., Winfield (Union Co.), Pa.

CORE DRILLS, SPUDDERS, ROTARIES. New and used equipment. Everything in supplies. Fishing tools rented. Pressey & Son, Pueblo, Colo.

FOR SALE: 86' Oilwell Mast, with 4½ Substructure. Telephone: CE 2-6318, Oklahoma City, Okla.

SALES AND RENTALS. Used cable drilling and fishing tools, casing, production equipment; from the Southwest's largest stock of oil field supplies. Degen Pipe and Supply Co., Tulsa.

3 Complete Rigs For Sale

1—8000' Rig Complete
1—4500' Rig Complete
1—2500' Rig Complete
Trucks and all Equipment
Terms

Box 1724, Billings, Montana

GASOLINE PLANT EQUIPMENT FOR SALE

3—800# 20 MMCF Absorbers with Scrubbers, etc.
1—Fluor "Counterflo" Induced Draft Cooling Tower Complete.
Other equipment, Instruments, Pumps, Pipe, Valves and Fittings necessary in Gasoline Plant Construction. Detailed Inventory Available upon request.

Southern Production Company, Inc.
P. O. Box 670, Phone FAnnin 8103, Fort Worth, Texas

SPECIAL OFFERING

125,000 feet, 12¾" OD 51.15# L.W. R-1 T and C or P.E. located in the Baton Rouge, Louisiana area. This pipe can be used for surface pipe or Line Pipe.

WRITE, WIRE, OR 'PHONE.
SUBJECT TO PRIOR SALE

Sabine Pipe & Supply Company
P. O. BOX 111.
PHONES 3094—3095
KILGORE, TEXAS.

FOR SALE

Equipment Formerly Used In

MAGNOLIA REFINERY—

FORT WORTH, TEXAS

Phones 5-2581 Beaumont, Texas.

259 Burleson, Texas.

Valley—7166 Fort Worth, Texas

FOR SALE EQUIPMENT

BRILL LIQUIDATION!

FORMER LACY REFINERY
BIG SANDY, TEXAS

COMPLETE POLY UNIT, BUILT 1950
UOP RATED 144 BBL./DAY

Complete Perco unit built 1950, Phillips Petroleum rated 1400 bbl./day.
1—Wyatt 30" x 70' Stabilizer 160# 30 tray
3—Absorbers, 14" x 40', 20" x 50', 160#
2—Wash Towers, 18" x 23', 150#
1—Reactor, 24" x 28', 550#
1—Depropanizer, 20" x 35', 450#
1—Debutanizer, 12" x 26', 120#
3—Brinkman vertical tube furnaces 2, 1¼ mil. BTU/hr.
20—Brown fintube exchangers, 600# 140 sq. ft. 4-6 chrome.
20—Brown fintube exchangers, 600# 11, 21, 77, 101, 140 sq. ft.
5—Adm. Heat Exchangers, 644, 424, 346, 176 sq. ft.
2—Perco reactors 4500 gal., 8' x 12', 347 stls. st. 120#, 1000° F.
1—5' x 96' tower, 40 tray, 135# WP.
1—7' x 30' Propane tank, 250# WP.
1—10' x 50' Crude tower, 18 trays.
1—6' x 34' Vacuum tower, 150#.
1—2' x 50' tower, 24 trays.
3—Welded tanks, 10' x 40', 10' x 30', 5' x 20'.
3—St. Exchs., 920, 850, 480 sq. ft.
9—Oilfield boilers, 125 hp., 275#.
1—Ethyl lead plant.
3—Penn. comp. 8 x 11 x 9, 12 x 11½ x 13, 10 x 6 x 11.
2—Convection furnaces, 20 MIL BTU/hr.
1—Vapor phase cracking furnace.
30—Welded storage tanks, 5000, 2000, 1000, 500 Bbl.
8—Hi-vol pumps, 10 x 7 x 18, 10 x 6 x 12, 6 x 4 x 12, 6 x 3 x 8.
30—Duplex piston pumps, all sizes.
1—10' x 30' asphalt still.
6—Steel Bldgs., 20 x 150, 12 x 20, 20 x 40, 20 x 20.
8—Gr Fin Tube Exchangers, 248 sq. ft. 500 lb.
1—BS&B Oil & gas separator, 10.7 mcf, 3500 Bbl./day.
Large Selection of Series 15, 30 Steel Valves, 1" to 8".
Approximately 15,000 ft. Schedule 40, 80 pipe, 2" to 8".

COMPRESSOR STATION—BALT., MD.

3—600 hp IR KVG Gas Comp.

EQUIPMENT ELSEWHERE

COLUMNS

7'6" x 55' 30 trays 45 lb.
8' x 75' 25 tray 40#
2' x 60' 35 tray 560#

HEAT EXCHANGERS

6—Adm. 785, 742, 425 sq. ft.
3—St. 2000, 785 sq. ft.
30—Atmospheric Bentube exch., stls and Adm. 715, 470 sq. ft.
30—304 SS shell & tube condensers 100-1000 sq. ft.

MISCELLANEOUS

Lab Petro-chem furnace 50,000 BTU/hr.
Gould 4" Pump 400 gpm 1600' hd.
B-J hot oil pump 3 x 9, 13 st, 325 gpm, 4620' hd.
Gould 16" pump 10,500 gpm, 135' hd.
800 ft. of 2" 4-6 ch pipe.
Large quantity of 410 SS chrome strips and sheets.
2 Worth. Centrifugal Pumps, 1500 gpm 50' hd.
1 BJ 8" Centrifugal Pump, 2000 gpm 115' hd.
1 BJ 2" Centrifugal Pump, 280 gpm 200' hd.
Tremendous selection stainless steel and steel valves ½" - 6".

Partial List Only

WIRE PHONE WRITE

For Detailed Circular

BRILL EQUIPMENT COMPANY

4101 San Jacinto St., Houston 4, Texas, JA 6-1351
Or
2401 Third Ave., New York 51, N. Y., CYpress 2-5703

FOR SALE EQUIPMENT

FOR SALE—145 H.P. Bros Wetherbee watertube 3-drum boiler, 125 P.S.I., located at Winnsboro, Texas, price $1,000. Contact American Liberty Oil Company, Engineering Department, Box 1011, Mt. Pleasant, Texas.

FOR SALE—At our Tallant, Oklahoma chemical plant 1—4½" x 6" FG-FXG Gardner-Denver valve pot type duplex power pump on skid and direct driven by 30 HP 3 phase explosion proof motor, price $1350.00 with motor, $1200.00 without motor. New April 1953. Used for pumping fresh water. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE—We are dismantling our chemical plant at Tallant, near Barnsdall, Oklahoma. Will have large quantity of brass, copper, aluminum pipe, valves and fittings available at 50% new. Contact Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE—At Tallant, Oklahoma, 1 Hudson 2 unit induced draft cooling tower, "as is", price $5000.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE—Several horizontal and vertical butane tanks at our Tallant, Oklahoma chemical plant. See T. P. Mace at plant. Price and list upon request. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE—At Tallant plant horizontal and vertical steel tanks. See T. P. Mace at plant or contact Cities Service Oil, Patridge, Bartlesville, Oklahoma.

GAS COMPRESSORS: 90 Horsepower Superior on skids. Complete packaged unit. Five Type 80 twin Coopers. Alfred B. Kern, 343 Kennedy Bldg., Tulsa, Okla.

FOR SALE: Wilson Double drum Mogul Drawworks Serial 6252 with 6-GAK-3 Waukesha engine. Bellaire Pipe & Supply Co., 8020 Lyons Ave., Houston 20, Tex. Phone OR-4-2763.

FOR SALE: 4—ZC-503 and 2—ZC-739 Fairbanks-Morse Oil Field Engines. Complete w/Clutch and V-Belts Sheaves. Completely overhauled. H & S Supply Company, Box 1271, Seminole, Oklahoma. Phones 1375 or 1127.

FOR SALE—Near Ponca City 6000 ft. 8" 28# single length plain end line pipe. Some ends beveled. $1.00 per ft. Cities Service Pipe Line, Patridge, Bartlesville, Oklahoma.

EQUIPMENT WANTED

WANTED: One tower approximately 7 feet diameter, 100 feet high, ¾" minimum wall, with 50 trays, to be used for isobutane splitter. Apply Box J-392, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

PIPE LINE ENGINEER with electrical and corrosion experience for products pipe line in Pennsylvania. Include brief resume with inquiry to P. O. Box 22, Harrisburg, Pa.

Reservoir Engineer

For Work on De Mares Concession, Colombia.

Experienced graduate engineer capable of estimating oil and gas reserves.

BOX J-394,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

OIL FIELD SERVICE ENGINEERS

Mechanical or Petroleum Engineers with some field experience. Men without degrees but with two years rotary or workover rig experience may qualify. High school diploma or equivalent required. Age under 35 preferred. Good pay with excellent fringe benefits. Automobile and expenses.

Contact

BAKER OIL TOOLS, INC.

P. O. Box 3048
HOUSTON 1, TEXAS

HELP WANTED

JUNIOR ENGINEER WANTED—Excellent opportunity for young engineer interested in employment with well-known aggressive oil company in its Production Department. Experience is not required, but applicant should have a college degree, preferably in Petroleum or Mechanical Engineering. Initial location would be in the General Office at Oklahoma City. Write giving age, education, and salary expected. Please address Anderson-Prichard Oil Corporation, Liberty National Bank Building, Oklahoma City 2, Oklahoma, for the attention of Mr. D. F. Tver, Industrial Relations Department.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

SEISMIC COMPUTERS and Surveyors for Field Parties in Oklahoma, West Texas. Republic Exploration Company, Box 2208, Tulsa.

GEOLOGICAL ENGINEER, Reserves Engineer, Reservoir Engineer, Geological and Reserves Engineers Must Have A Minimum Of Three Years Experience. Reservoir Engineer A Minimum Of Three Years Experience Gulf Coast Area. Submit Complete Resume Of Experience, Education And Salary Requirements. These Engineers Are Needed By An Aggressive New Oil Company. Potential Growth Gives Possibility Of Rapid Advancement. Box J-397, The Oil and Gas Journal, Tulsa, Oklahoma.

Plant Equipment Inspectors

Graduate engineers with minimum 5 years' experience in design or inspection of petroleum processing plants and equipment. Major part of experience must have been in inspection work entailing general knowledge of all facilities. Develop inspection methods, supervise and conduct inspections and advise operations on codes and equipment limitations in a major oil installation located in Saudi Arabia.

Write giving full particulars regarding personal history and work experience. Please include your telephone number.

Recruiting Supervisor, Box 90

ARABIAN AMERICAN OIL COMPANY

505 PARK AVENUE
NEW YORK 22, NEW YORK

REFINERY EQUIPMENT INSPECTOR

Man with minimum of five years experience in maintenance and inspection of mechanical equipment, three of which must be in a modern oil refinery or petro-chemical plant.

Must have thorough knowledge of engines, refinery processing units, theory of stresses and causes, and control of corrosion.

Duties will include the inspection of mechanical condition of all tanks and vessels, pipe lines and fittings, processing units, pumping units, heavy mechanical equipment, and fire fighting equipment.

Send complete resume of education and experience, including salary requirements. All replies confidential.

GREAT NORTHERN OIL COMPANY

P. O. Box 3596
Saint Paul 1, Minnesota

HELP WANTED

WANTED—Experienced man with proven ability to obtain rotary drilling contracts. Must be willing to relocate. Box J-414, The Oil and Gas Journal, Tulsa, Oklahoma.

UTILITIES SUPERVISOR

Graduate mechanical engineer with minimum of five years experience in the power field, and preferably with some electrical experience.

Specific duties will involve supervision of boiler plant operation, plant and instrument air systems, cooling towers and water distribution systems.

Working background required in process instrumentation and maintenance of electrical distribution and equipment.

Send complete resume of education and experience including salary requirements. All replies confidential.

GREAT NORTHERN OIL COMPANY

P. O. Box 3596
Saint Paul 1, Minnesota

DESIGN ENGINEERS

Piping Layout, Structural Steel, Concrete, Process Heaters, Equipment Specifications, Layout and Process Design. Also Piping and Electrical Draftsmen.

You can fill a desirable **permanent** position in McKee's enlarged Refinery, Metals or Industrial Divisions. Our expansion program gives you excellent opportunity for advancement in one of the world's largest engineering firms.

World-wide McKee operation offers you a broad field in the design of Petroleum Refineries, Chemical Plants, Blast Furnaces, Steel Plants, Sintering Plants and Industrial Plants.

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You'll work with modern equipment in large air-conditioned quarters. Free parking on premises.

Cleveland has attractive residential areas, excellent schools and colleges for you and your family. McKee makes generous transportation and moving allowances.

Write for an interview giving education and experience. No age limitations. All letters kept strictly confidential. Write today to:

EDWARD A. KOLNER

Arthur G. McKee & Company

2300 Chester Avenue
CLEVELAND 1, OHIO

HELP WANTED

EXPERIENCED NATURAL GAS engineers or petroleum engineers with natural gas experience needed by oil company with expanding gas operations. Minimum of 4 years necessary. Applicants should submit resume of education, experience and state salary expected. All applications treated confidentially. Box J-385, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

EXPERIENCED Petroleum Engineers to fill vacancies created by expansion wanted by medium sized oil company operating in all areas east of California. Applicants should have minimum of 3 years field experience. Replies confidential. Please furnish detailed summary of academic and experience background. Box J-377, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

PROCESS ENGINEER, 4 to 6 years experience with emphasis on refinery operations. Initial letter application should set out experience in detail, education and salary requirements. Texas location. Box J-350, The Oil and Gas Journal, Tulsa, Oklahoma.

PATENTS

Petroleum company has the following positions available in Cleveland, Ohio, in a small but expanding patent division of a research- and patent-minded organization:

1. Patent attorney with sufficient experience in chemical applications to work with minimum supervision in preparing and prosecuting applications before the Patent Office and proceedings in which they may become involved.
2. Chemist or chemical engineer with at least BS, recent graduate, as trainee in patent division. Night law school available with generous company contributions toward law school courses.
3. Chemist with some research background for work with research division in liaison with patent attorneys. Some experience in this area essential, and preferably in the petroleum industry.

THE STANDARD OIL CO. (OHIO)

Reply to E. G. Glass, Jr., 1737 Midland Bldg.

CLEVELAND 15, OHIO

GULF RESEARCH & DEVELOPMENT COMPANY

Has positions now open for

- **ELECTRICAL ENGINEERS & PHYSICISTS—B.S., M.S.**

Design and development of electronic equipment and instruments for recording and remote reading of deep well pressures, temperature, flow; production, pipeline and off-shore instrumentation, control and automation.

- **MECHANICAL ENGINEERS—B.S., M.S., Ph.D.**

Design and development of mechanical or hydraulic equipment and techniques for drilling and completion of wells; fracturing of earth formations; flow and treatment of well and pipeline fluids.

- **PETROLEUM ENGINEERS—M.S., Ph.D.**

Development of techniques and equipment for drilling and completion of wells; improvement of productivity into boreholes; production methods; fracturing of formations; consolidation of sands; development of thermal recovery techniques, reservoir behavior analysis, uses of pressure and temperature transients.

- **CHEMICAL ENGINEERING—B.S., M.S., Ph.D.**

Development of physical properties, chemical formulations, techniques of treatment and design of experimental equipment for investigation of colloidal fluids used in well drilling; chemical treatment of produced fluids; and other applications of chemical engineering to oil field production problems. Investigation of the chemistry and engineering of in situ combustion techniques for oil recovery; investigation of the pressure-volume-temperature relationships of hydrocarbons and the use of thermodynamical data in the production techniques.

★ Positions are permanent ★ New facilities
★ Excellent working conditions ★ Suburban location
★ Liberal publication policy ★ Excellent advancement opportunities
★ Salaries open

Apply in writing to: GULF RESEARCH & DEVELOPMENT COMPANY
P. O. Drawer 2038
Pittsburgh 30, Pennsylvania

PIPE LINE ENGINEER

Graduate engineer with 4 - 7 years pipe line experience for engineering department of major crude and products pipe line company. Location in Texas. Salary according to qualifications. Give full details of experience.

Box J-386, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERS

Active independent oil company has vacancies for graduate petroleum engineers with two to five years of practical experience in drilling and production in West, West Central or North Texas. Excellent opportunities for growth and advancement. Replies should furnish complete personal data, education, experience, and starting salary desired.

BOX J-300,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

LANDMAN

Independent Oil Company has opening March 15 for experienced, aggressive Landman in Mid-Continent area. Must have good personality and be capable of handling all phases of land activities. Age limit 40. Independent oil company or broker experience preferred. Good opportunity for right person. This position is salaried. In replying give past employment record and educational background. All replies confidential. Reply

Box J-411,

The Oil and Gas Journal,

Tulsa, Oklahoma.

AREA MAINTENANCE SUPERVISOR

Man with Mechanical Engineering degree and with minimum of five years of responsible experience in refinery maintenance or construction.

Will assist maintenance supervisor of new independent refinery in the direction of all maintenance activities on assigned process units.

Must be capable of determining the best methods of performing these activities through the use of proper tools and equipment and through coordination with other departments.

Send complete resume of education and experience, including salary requirements. All replies confidential.

GREAT NORTHERN OIL COMPANY

P. O. Box 3596

Saint Paul 1, Minnesota

HELP WANTED

MECHANICAL ENGINEERS—M.E. Degree required for work involving Research, Design, and/or Development of oilfield specialties. Apply Personnel Department, Mission Manufacturing Co. P. O. Box 4209, Houston, Texas.

FOREIGN. Major Oil Company, Our Fee paid. Mechanical, Electrical, Petroleum, Civil and Chemical Engineers—All requiring degree, experienced or inexperienced. Accountant (single) under 32, Accounting Major Graduate. Geologist (single) Degree. Driller, under 40, five years Rotary experience. Stenographer (Male, single) under 32, three years experience. Tool Pusher, three years experience. On all jobs, where not specified, age limit is 40. All information confidential. Contact CHAS. J. LOVELESS PERSONNEL SERVICE, 616 South Main, Tulsa, Oklahoma—GIbson 7-3193.

HELP WANTED

EMULSION PLANT SUPERVISOR. Venturing into asphalt emulsions and have opening for man thoroughly experienced in this field. Preferably under 35 years of age. Location Tuscaloosa, Alabama. Submit complete resume of background and experience. Hunt Oil Company, P. O. Box 3053, Dallas, Texas.

Permanent position for storekeeper in expanding chemical plant located in northwest Florida. Applicant must have thorough knowledge of related materials. Ten years experience preferred. Salary commensurate with experience. State full qualifications and address replies to

Box J-405, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

PETROLEUM ENGINEER

B.S. or equivalent with 5 years experience in field and office. Experience in gas production desirable.

Send complete resume of background, experience and salary requirements to:

Tellepsen Petro-Chem Constructors

P. O. Box 2536 Houston, Texas

Unusual opportunity with substantial salary for qualified

DEVELOPMENT AND DESIGN ENGINEER

This position offers a secure future and excellent possibilities for advancement with a major oil equipment manufacturing concern. Please give complete personal history and experience. Salary open. All inquiries will be acknowledged and held in confidence.

Interviews will be arranged in Houston. Write

Box J-359, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEERS

For responsible staff positions in New York Office directing the work of groups of experienced engineers doing process evaluation and design, economic studies and related work on refining and crude oil handling facilities, together with supporting power plants and other utilities. Work entails occasional trips of short duration to Europe and Middle East. Chemical Engineering degree plus 5 years' process experience, preferably in petroleum.

Salary commensurate with training and work experience. Liberal benefit program. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 100

ARABIAN AMERICAN OIL COMPANY

505 Park Ave., New York 22, N. Y.

UNUSUAL OPPORTUNITY FOR TOP REFINING EXECUTIVE

If you already have a good top executive job in the refining industry but want to further improve your future with a large fully-integrated mid-western oil company—*this may be the most important advertisement you ever read!*

A proven ability to manage and operate a progressive and aggressive refining program including the manufacture of gasolines, lubricating oils and waxes is required . . . a technically trained man with considerable practical operating experience would be ideal . . . abilities in personnel management of more than 1,500 employees is essential. You and your family will enjoy living in one of the most metropolitan cities in the south-west.

If you are this executive, between the ages of 45 and 50, interested in a vice-president's status (you may be one now—and we hope so), a liberal stock option arrangement in a large fully-integrated company which is still growing, and a salary commensurate with abilities and production results—*it will profit you to write today for appointment interview.*

Box J-396, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS

Houston refinery has openings for Chemical and Petroleum Engineers with refinery experience. Salary open.

Send complete resume to

P. O. Box 5008
Harrisburg Station
Houston 12, Texas

MECHANICAL ENGINEER

Graduate Mechanical Engineer with minimum of three years experience in oil refinery engineering. Must be capable of performing general refinery engineering work and aid in development of design specifications for refinery processing equipment.

Duties will be closely integrated with operations of new independent refinery which includes crude distillation, catalytic cracking, polymerization, coking and utilities.

Send complete resume of education and experience including salary requirements. All replies confidential.

GREAT NORTHERN OIL COMPANY

P. O. Box 3596
Saint Paul 1, Minnesota

HELP WANTED

ENGINEER—Chemical or mechanical for development work in gasoline testing laboratory. Experience in gasoline quality tests including CFR engine is desirable. Excellent working conditions. Apply Ethyl Corporation, 1066 Nepperhan Avenue, Yonkers, N. Y.

DRILLING SUPERINTENDENT—An established well known Drilling Company has an opening in the Rocky Mountain area for a man with five years experience as a Rotary Driller on power rigs, two years as a Tool Pusher, and a minimum of two years college. Must be capable of supervising all emergencies, such as fishing jobs, blow outs, lost circulation, coring, testing, etc. Write giving age education, marital status, and complete details of experience. Box J-404, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER

Are you interested in a sales engineering position in the field of instrumentation and automation? We are looking for chemical, electrical or mechanical engineering graduates, 25 to 35 years of age for Odessa, Texas and Dallas, Texas. Must be willing to locate here and travel adjacent territory.

Compensation on straight salary basis, all expenses paid and car furnished with liberal fringe benefits. Sales experience desirable, but not necessary as we provide Klein Sales Aptitude Test at our expense.

Successful applicants will receive thorough training course at our factory, Foxboro, Massachusetts before being assigned to branch office.

If you are interested in a real opportunity with a progressive organization, please write E. L. Stark, The Foxboro Company, 11710 East Northwest Highway, Dallas 18, Texas, sending complete resume of education and past experience.

FOREIGN EMPLOYMENT

The Arabian American Oil Company has immediate job openings for unmarried males with minimum 5 years' experience in the following classifications:

BOILER FIREMAN
High pressure boiler experience.

TURBINE OPERATOR
Electric power generation experience.

ELECTRICIAN
Heavy industrial construction and maintenance experience.

MACHINIST
Inside and outside experience.

INSTRUMENT REPAIRMAN
Oil refinery or chemical processing experience.

CHEFS
Large scale institutional, restaurant or construction camp experience.

Write outlining personal history and work experience.
Recruiting Supervisor, Box 122

ARABIAN AMERICAN OIL COMPANY

505 PARK AVENUE
NEW YORK 22, NEW YORK

SITUATIONS WANTED

PETROLEUM GEOLOGIST; 38, B.S., M.S., approximately six years petroleum experience in Gulf Coast, Texas and California. Desires petroleum exploratory work. Box J-413, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, 46, Master's, nineteen years experience all phases of industry with both majors and independents, mainly on Gulf Coast, but also familiar with other areas. Box J-390, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST-GEOPHYSICIST — B.S. in Geology. Fourteen years of geophysical experience including supervision and 1 year of sub-surface geology. Desire permanent position with reliable company. Box J-382, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE, age 35, with background of leasing, geology, production in Mid-Continent area, desires position with active independent or small company on salary and interest basis. P. O. Box 7338, Tulsa, Okla.

GEOLOGICAL ENGINEER, highly experienced Oklahoma, Amarillo and Hugoton Areas. Responsible supervisory position desired. Box J-398, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER, 32, married, family. Seven years major company experience. Workovers, well completions and all phases of waterflooding. Employed. Box J-338, The Oil and Gas Journal, Tulsa, Oklahoma.

GAS ACCOUNTANT with several years experience in general and gas accounting and some experience in supervising personnel—about 35 years age. Box J-391, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST—Seismic party chief with excellent education and highly varied experience desires permanent interpretational position. Box J-417, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 28, employed, 4 years diversified experience in reservoir valuations, completions, and secondary recovery. Desires position with aggressive independent in West Texas or Rocky Mountain areas. Box J-420, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOGRAPH Supervisor over twenty years wide areal experience all phases operations and interpretation, employed, seeking situation with greater permanency, major oil company or stable independent Box J-322, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER OFFICE MANAGER, large independent, 15 yrs. heavy, wide experience in land, leasing and titles; also law and accounting. Capable assuming full responsibility office management and/or land department. Wide acquaintance in oil circles. Best references. Box J-407, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC PARTY CHIEF, good background in Physics and Mathematics plus seven years domestic and foreign experience desires foreign employment with Oil Company or Contractor. Box J-406, The Oil and Gas Journal, Tulsa, Oklahoma.

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited.

Write, wire, or call collect for further information.

MAKIN DRILLING COMPANY
P. O. Box 1628, Hobbs, New Mexico
Phone 3-3141.
146 Allen Building, Midland, Texas
Phone 2-2962.

MAILING LISTS

MAILING LISTS
Royalty Investors. Other oil lists. Oil Industry Mailing List Co., 405 Tuloma Bldg., Tulsa, Okla.

ROYALTIES

HIGHEST PRICES PAID for choice oil and gas income royalties, overrides, oil properties. A. S. Berry, P. O. Box 1383, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

CONTACT A. L. Bowles, Box 947, Ada, Okla., for Drilling Deals, Oil Production.

FOR SALE: Three year option on 33,000 acre block in T 11 & 12 S, R 94 W, Delta Co., Colo. $2.50 & 2½% ORR. Good gas possibilities. Box J-379, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE FOR SALE—central west Kentucky joining companies planning drilling. Can join drilling if desired. L. M. West. Box 27, Marion, Ky.

OIL, GAS & URANIUM lease, 78,400 acres New Mexico. Solid tract, one owner. $1.00 per acre bonus, 50c per acre annual rentals 10 commercial lease. Box J-418, The Oil and Gas Journal, Tulsa, Oklahoma.

1200′ STRIPPER production, 38 gravity oil, Strawn sand, North Texas, available for re-pressuring or flooding projects, approximately 400 acres and undrilled locations. Watburn Oil Company, Box 297, Tyler, Texas.

FOR SALE: 38 Uranium claims Gardner Basin, Colorado. Surface ore; commercial assay. $1,000 per claim and 10% royalty. Write Grover C. Zweifel, 1724 North Market, Shawnee, Oklahoma.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
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HAVE TWO GOOD oil or gas locations and will drill soon. Will sell from 1/64 to ½ interest with wells full completed. Both wells will have good geology. If interested will furnish full information. Best of references. Box J-419, The Oil and Gas Journal, Tulsa, Oklahoma.

ARE YOU SEEKING CAPITAL for Drilling Syndicates? Have important contacts with Eastern investors in favorable tax brackets to finance series of drilling syndicates. What have you to offer? Box J-415, The Oil and Gas Journal, Tulsa, Oklahoma.

INVENTORS ATTENTION! . . . Established California firm desires to manufacture on royalty or license basis, metal products selling to oil refineries and chemical plants—or will purchase outright. Box J-378, The Oil and Gas Journal, Tulsa, Oklahoma.

AS AN ENGINEER I am constantly contacting owners of oil and gas properties for sale. Have some excellent deals now in East Texas and Louisiana. Taylor Suite, 618 Kilgore Hotel, Kilgore, Texas.

OIL COMPANY

Listed on American Stock Exchange.
Wants to acquire
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Box J-416,

The Oil and Gas Journal,

Tulsa, Oklahoma.

WANTED

WANTED: Producing royalties. Send report and full information to: C. A. Awalt, 811 Century Building, Fort Worth, Texas.

WANTED TO PURCHASE oil production or corporations having production for cash or stock in a listed company (or combination of both). All replies strictly confidential. Box J-412, The Oil and Gas Journal, Tulsa, Oklahoma.

WANT TO BUY

In order to build up reserves—Settled production or company with production—Small or large—Oklahoma, Kansas or Texas—All replies in strictest confidence.

Seminole Production Company Ltd.,
815 American National Bldg.,
Oklahoma City, Oklahoma.

Equipment Men

Crose and Its Affiliates Sold to Graham-Paige Corp.

Purchase of M. J. Crose Manufacturing Co., Tulsa manufacturer of specialized equipment for the pipeline-construction industry, by Graham-Paige Corp., New York investment firm, has been jointly announced by D. M. Curran, owner and president of Crose, and Rear Admiral John J. Bergen (Ret.), chairman of Graham-Paige and new chairman of Crose. The change in Crose ownership is effective immediately.

Equipment which Crose manufactures includes internal lineup clamps, both stationary and line-traveling coating and wrapping machines, and road-boring equipment.

D. M. CURRAN

CLARE MILLER

The other principal officer of Crose, Vice President Clare Miller, stated that Crose will continue to operate under its present name as a division of Graham-Paige. Officials of the involved companies stated there will be no change in management or policies.

For Graham-Paige, this is the second major investment in the oil-field-equipment industry in less than 4 months. The firm last October bought United Supply & Manufacturing Co., Tulsa supply firm having over 28 oil-field stores in five states.

Crose manufacturing facilities spread out over a large area adjacent to "oil-field row" in Tulsa, Dawson Road, and has about 100 employes, with branches in Houston, Denver, and Newark, N. J.

Crose was organized in 1947. A Crose subsidiary, Pipe Line Anode Corp. of Tulsa, which specializes in cathodic protection, was included in the Graham-Paige purchase, as was Crose-Curran, Ltd., Edmonton, distributor for the Tulsa manufacturing firm.

Jones Shifted to Hobbs For Chemical Process Co.

Austin Jones, a member of the research staff in Chemical Process Co.'s laboratory in Breckenridge, Tex., has been transferred to the firm's Hobbs district as a field engineer. Austin joined Chemical Process early last year and spent several months in the field prior to entering the company's lab.

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LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Land Office, Salt Lake City, Utah. Notice is hereby given that approximately 440 acres of land in three parcels: Parcel #1, $S\frac{1}{2}NW\frac{1}{4}$, $N\frac{1}{2}SW\frac{1}{4}$ Sec. 13, total 160 acres; Parcel #2, $S\frac{1}{2}SW\frac{1}{4}$ Sec. 13, $N\frac{1}{2}NW\frac{1}{4}$ Sec. 24, 160 acres; Parcel #3, $W\frac{1}{2}SE\frac{1}{4}$ Sec. 13, $NW\frac{1}{4}NE\frac{1}{4}$ Sec. 24, 120 acres, all in T. 15 S., R. 11 E., S.L.M., within the known geologic structure of the Farnham Dome field, Utah, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 2 p. m., M.S.T., March 16, 1956, when bids will be opened. Details of the lease offering, how and where to submit bids, may be obtained from the Bureau's Salt Lake City, Utah, office. Ernest E. House, Manager, Land Office, Salt Lake City, Utah.

Now! Aircraft power—remote controlled for fracturing, acidizing

The 1500 h.p. Allison aircraft engine, after posting a remarkable record as a power plant for fighter planes, has been adapted by Dowell to bring you increased fracturing and acidizing effectiveness.

It's the most powerful engine in fracturing—12 cylinders, liquid cooled. And Dowell has mounted it on one truck together with the specially built DR power-frame pump for compactness, mobility and efficiency. Here's power when you want it.

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For more information or service, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write to Dowell Incorporated, Tulsa 1, Oklahoma, Dept. C-11.

services for the oil industry

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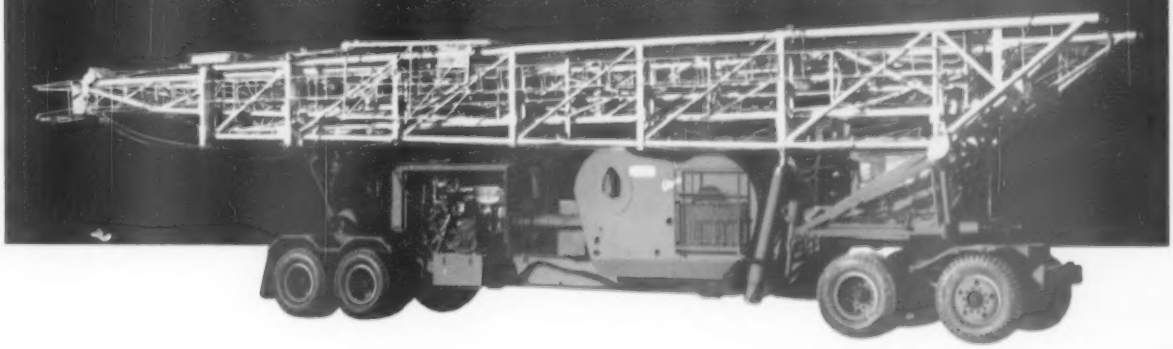

FRANKS *Clipper*

The Franks Clipper is a unit basically built for servicing—the main job of the unit—but which is also self propelled, using the drawworks motor for road power.

One feature is that the Clipper heads into location making "spotting" much quicker and easier. The use of outriggers makes the unit more stable and assures operation without ground guylines.

The Clipper moves completely strung-up and is the fastest location-to-location unit, rig-up and rig-down unit on the market. Franks unit is fully field tested. It will pay you to look at a Clipper before you buy.

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"ON THE SPOT" FIELD SERVICE

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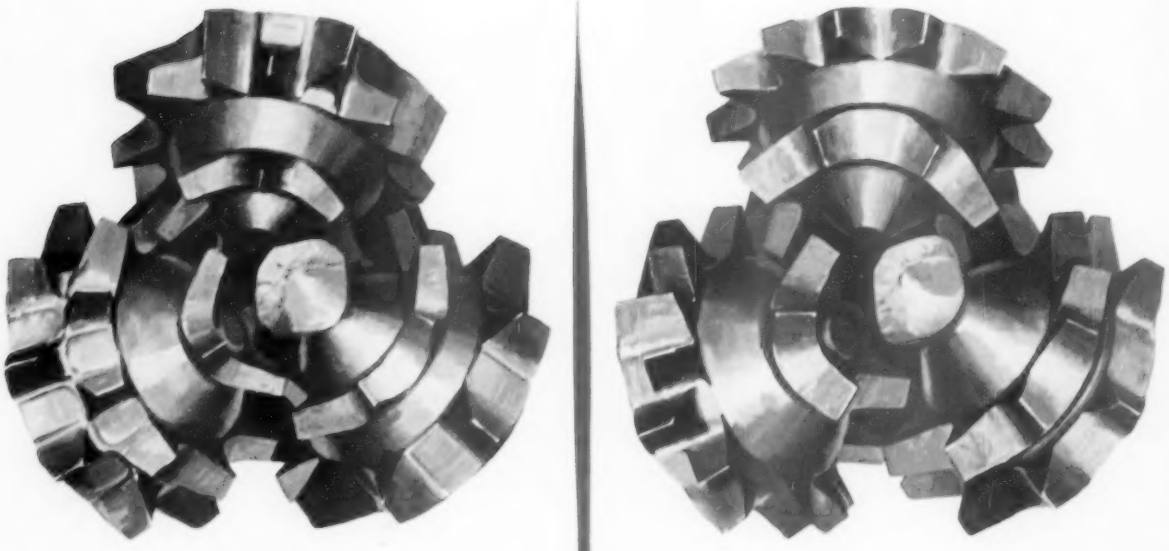
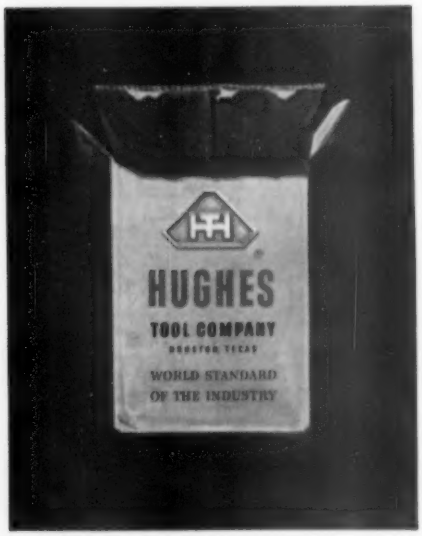
THEY LOOK ALIKE ... but



there's a difference in their performance



The two rock bits pictured here are excellent examples of the fact that bits that may look alike don't always perform alike.

Both bits are similar in design. But changes have made the second bit a faster cutting, better-performing, more versatile bit... capable of drilling a wider range of formations.

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